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Report of the technical review of the sixth national communication of the United Kingdom of Great Britain and Northern Ireland

Parties included in Annex I to the Convention are requested, in accordance with decision 9/CP.16, to submit a sixth national communication to the secretariat by 1 January 2014. In accordance with decision 7/CMP.8, Parties included in Annex I to the Convention that are also Parties to the Kyoto Protocol shall include in their sixth national communication supplementary information under Article 7, paragraph 2, of the Kyoto Protocol. In accordance with decision 15/CMP.1, these Parties shall start reporting the information under Article 7, paragraph 1, of the Kyoto Protocol with the inventory submission due under the Convention for the first year of the commitment period. This includes supplementary information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol.

This report presents the results of the technical review of the sixth national communication and supplementary information under the Kyoto Protocol of the United Kingdom of Great Britain and Northern Ireland conducted by an expert review team in accordance with the "Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention" and the "Guidelines for review under Article 8 of the Kyoto Protocol".

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I. Introduction and summary

A. Introduction

1. For the United Kingdom of Great Britain and Northern Ireland, the Convention entered into force on 21 March 1996 and the Kyoto Protocol on 16 February 2005. Under the Convention, the United Kingdom, as a member State of the European Union (EU), made a commitment to contribute to the joint EU greenhouse gas (GHG) emission reduction target of 20 per cent below the 1990 level by 2020. Within the burden-sharing agreement of the EU for meeting commitments under the Kyoto Protocol, the United Kingdom committed itself to reducing its GHG emissions by 12.5 per cent compared with the base year[1] level during the first commitment period, from 2008 to 2012. For the second commitment period of the Kyoto Protocol, from 2013 to 2020, the United Kingdom committed to contributing to the joint EU commitment to reduce its GHG emissions by 20 per cent below the base year level.

2. This report covers the in-country technical review of the sixth national communication (NC6) of the United Kingdom, coordinated by the secretariat, in accordance with the "Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention" (decision 23/CP.19) and the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1).

3. The review took place from 15 to 20 September 2014 in London, United Kingdom, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: Mr. Sandro Federici (San Marino), Mr. Jozsef Feiler (Hungary), Mr. Mahendra Kumar (Fiji) and Mr. Johan Remko Ybema (Netherlands). Mr. Federici and Mr. Ybema were the lead reviewers. The review was coordinated by Ms. Sylvie Marchand (secretariat).

4. During the review, the expert review team (ERT) reviewed each section of the NC6. The ERT also reviewed the supplementary information provided by the United Kingdom as part of the NC6 in accordance with Article 7, paragraph 2, of the Kyoto Protocol. In addition, the ERT reviewed the information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol, which was provided by the United Kingdom in its 2014 annual submission under Article 7, paragraph 1, of the Kyoto Protocol.

5. In accordance with decisions 23/CP.19 and 22/CMP.1, a draft version of this report was communicated to the Government of the United Kingdom, which provided comments that were considered and incorporated with revisions into this final version of the report.

B. Summary

6. The ERT conducted a technical review of the information reported in the NC6 of the United Kingdom in accordance with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications" (hereinafter referred to as the UNFCCC

[1] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for carbon dioxide, methane and nitrous oxide and 1995 for perfluorocarbons, hydrofluorocarbons and sulphur hexafluoride. The base year emissions include emissions from sectors/source categories listed in Annex A to the Kyoto Protocol.

reporting guidelines on NCs). As required by decision 15/CMP.1, supplementary information required under Article 7, paragraph 2, of the Kyoto Protocol[2] is provided in the NC6 (see paras. 161 and 162 below). The supplementary information on the minimization of adverse impacts referred to in paragraph 4 above is complete and transparent.

7. The United Kingdom implemented most of the recommendations provided in the report of the in-depth review of the fifth national communication (IDR/NC5) of the United Kingdom.[3] The ERT commended the United Kingdom for its improved reporting. During the review, the United Kingdom provided further relevant information on marine bunker fuels, projections updates, what financial resources are to be considered "new and additional" and the costs of individual policies and measures (PaMs).

1. Completeness and transparency of reporting

8. Gaps and issues related to the reported information identified by the ERT are presented in table 1 below.

9. The executive summary of the fifth national communication (NC5) did not cover some of the chapters of the national communication (NC); consequently, the IDR/NC5 contained a recommendation by the ERT to ensure completeness of the executive summary. The ERT noted that the executive summary of the NC6 covers all chapters; the ERT commends the United Kingdom for this improvement.

10. The ERT noted that the NC6 does not contain a specific annex where all references to additional relevant background information are reported; furthermore, some references provided in the text generically point to entire websites, and in other cases, the linked web page is no longer active. Although the ERT acknowledges that such an annex would require much work in view of the large amount of activities and related information on climate change mitigation and adaptation and its rapid evolution, the ERT believes that providing references to relevant background information in a single place and in a systematic way would greatly increase the informative value of the NC. Therefore, the ERT suggests that the United Kingdom consider linking the next NC to an online repository where all relevant information related to mitigation and adaptation of climate change is collected/referred to, organized in an easily accessible manner and regularly updated.

2. Timeliness

11. The NC6 was submitted on 20 December 2013, before the deadline of 1 January 2014 mandated by decision 9/CP.16.

3. Adherence to the reporting guidelines

12. The information reported by the United Kingdom in its NC6 is mostly in adherence to the UNFCCC reporting guidelines on NCs as per decision 4/CP.5 (see table 1).

[2] Decision 15/CMP.1, annex, chapter II.
[3] FCCC/IDR.5/GBR.

Table 1
Assessment of completeness and transparency issues of reported information in the sixth national communication of the United Kingdom[a]

Sections of national communication	*Completeness*	*Transparency*	*Reference to paragraphs*	*Supplementary information under the Kyoto Protocol*	*Completeness*	*Transparency*	*Reference to paragraphs*
Executive summary	Complete	Transparent		National systems	Complete	Transparent	
National circumstances	Complete	Transparent		National registries	Complete	Transparent	
Greenhouse gas inventory	Complete	Transparent		Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17	Complete	Transparent	
Policies and measures (PaMs)	Mostly complete	Mostly transparent	34, 35	PaMs in accordance with Article 2	Mostly complete	Transparent	91
Projections and total effect of PaMs	Mostly complete	Transparent	117	Domestic and regional programmes and/or arrangements and procedures	Mostly complete	Transparent	26
Vulnerability assessment, climate change impacts and adaptation measures	Complete	Transparent		Information under Article 10[b]	Complete	Transparent	
Financial resources and transfer of technology	Mostly complete	Mostly transparent	124, 134, 135	Financial resources	Mostly complete	Mostly transparent	124
Research and systematic observation	Complete	Transparent		Minimization of adverse impacts in accordance with Article 3, paragraph 14	Complete	Transparent	
Education, training and public awareness	Complete	Transparent					

[a] A list of recommendations pertaining to the completeness and transparency issues identified in this table is included in the chapter on conclusions and recommendations.

[b] For the purposes of reporting information in this table, this assessment refers to information provided by the Party on the provisions contained in Article 4, paragraphs 3, 5 and 7, of the Convention reported under Article 10 of the Kyoto Protocol, which is relevant for developed country Parties and other developed Parties included in Annex II to the Convention only. Assessment of the information provided by the Party on the other provisions of Article 10 of the Kyoto Protocol is provided under the relevant substantive headings under the Convention, for example, research and systematic observation.

II. Technical review of the reported information in the national communication and supplementary information under the Kyoto Protocol

A. Information on greenhouse gas emissions and national circumstances relevant to greenhouse gas emissions and removals, including other elements related to the Kyoto Protocol

1. Information on relevant national circumstances

13. In its NC6, the United Kingdom has provided a detailed description of the national circumstances relevant to GHG emissions and removals and elaborated on the framework legislation and key policy documents on climate change. Further information on the review of the institutional and legislative arrangements for the coordination and implementation of PaMs is provided in chapter II.B below.

14. The ERT noted that although the description of national circumstances is complete and transparent, the reporting could be enhanced by including more information on the United Kingdom's overall approach to and governance system in place for addressing climate change (governance structure, legal framework, market regulations and private/public partnerships), including how the United Kingdom develops, implements, monitors, verifies and reports on its actions to address climate change, and by including more information on the socioeconomic system and social characteristics that underpin the country's elaborate response to climate change. Additional information could also be provided on the United Kingdom's approach to innovation (e.g. funding of education and research, its university system and how it incorporates a business approach to, and the marketing of, innovation) and its cultural approach to sustainability (e.g. large number of people active in environmental organizations).

15. Furthermore, noting the very wide involvement of the United Kingdom in climate change mitigation and adaptation, both nationally and internationally, and the rich experience accumulated, the ERT suggests that the next NC could be complemented with information on the most relevant lessons learned, for example, on collecting information and data, setting strategies, planning measures, monitoring measures' implementation and adjusting them, on the involvement of private and public organizations/companies, and on the scaling up of action to the international level. Such information would be very useful for other countries in their efforts to build knowledge, exchange experiences, build relationships, form partnerships and, consequently, change their (energy-related) culture.

16. The ERT noted that during the period 1990–2012, the United Kingdom's population and gross domestic product (GDP) increased by 11.3 and 61.2 per cent, respectively, while GHG emissions per capita and GHG emissions per GDP unit decreased by 32.8 and 53.6 per cent, respectively. Table 2 illustrates the national circumstances of the United Kingdom by providing some indicators relevant to GHG emissions and removals.

Table 2
Indicators relevant to greenhouse gas emissions and removals for the United Kingdom

	1990	*2000*	*2005*	*2010*	*2012*	*Change 1990–2012 (%)*	*Change 2011–2012 (%)*
Population (million)	57.24	58.89	60.24	62.26	63.71	11.3	1.5
GDP (2005 USD billion using PPP)	1 283.57	1 734.10	2 006.91	2 040.35	2 068.88	61.2	0.3
TPES (Mtoe)	205.92	222.96	222.64	201.42	192.23	–6.6	2.8
GHG emissions without LULUCF (kt CO_2 eq)	783 412.30	704 435.33	688 264.83	613 217.89	586 357.13	–25.2	3.0
GHG emissions with LULUCF (kt CO_2 eq)	785 291.27	702 342.67	682 586.70	605 969.26	579 378.74	–26.2	3.1
GDP per capita (2005 USD thousand using PPP)	22.42	29.45	33.32	32.77	32.47	44.8	–1.2
TPES per capita (toe)	3.60	3.79	3.70	3.24	3.02	–16.1	1.3
GHG emissions per capita (t CO_2 eq)	13.69	11.96	11.43	9.85	9.20	–32.8	1.4
GHG emissions per GDP unit (kg CO_2 eq per 2005 USD using PPP)	0.61	0.41	0.34	0.30	0.28	–53.6	2.7

Sources: (1) GHG emission data: the United Kingdom's 2014 GHG inventory submission, version 1.2; (2) Population, GDP and TPES data: International Energy Agency.

Note: The ratios per capita and per GDP unit are calculated relative to GHG emissions without LULUCF; the ratios are calculated using the exact (not rounded) values and may therefore differ from ratios calculated with the rounded numbers provided in the table.

Abbreviations: GDP = gross domestic product, GHG = greenhouse gas, LULUCF = land use, land-use change and forestry, PPP = purchasing power parity, TPES = total primary energy supply.

2. Information on the greenhouse gas inventory, emissions and trends

17. The United Kingdom provided in its NC6 a summary of information on GHG emission trends for the period 1990–2011. This information is fully consistent with the 2013 national GHG inventory submission. Summary tables, including trend tables for emissions in carbon dioxide equivalent (CO_2 eq) (given in the common reporting format tables), are provided in an annex to the NC6. During the review, the ERT took note of the 2014 annual submission, which includes updated GHG emission estimates and additional data for the year 2012. The relevant information therein is reflected in this report.

18. Total GHG emissions[4] excluding emissions and removals from land use, land-use change and forestry (LULUCF) decreased by 25.2 per cent between 1990 and 2012, whereas total GHG emissions including net emissions or removals from LULUCF decreased by 26.2 per cent over the same period. This has been driven by a range of factors, including the shift from coal-fired power generation towards electricity generation based on natural gas and renewable energy, the tighter regulation of landfills, energy efficiency standards and the abatement of emissions in adipic acid and nitric acid production.

19. Overall, the profile of emissions by gas slightly changed between 1990 and 2012, but the order of gases by share remained the same: of the total GHG emissions, CO_2 was responsible for 75.5 per cent in 1990 and 82.4 per cent in 2012, methane (CH_4) for 13.9 per

[4] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO_2 eq excluding land use, land-use change and forestry, unless otherwise specified.

cent in 1990 and 9.0 in 2012, nitrous oxide (N_2O) for 8.8 per cent in 1990 and 6.0 per cent in 2012 and fluorinated gases (F-gases) for 1.8 per cent in 1990 and 2.5 per cent in 2012. The overall decrease in emissions was mainly attributed to CO_2 emissions, which decreased by 18.3 per cent over this period. Emissions of other gases decreased as well, overall by 46.4 per cent, with CH_4 emissions decreasing by 51.6 per cent and N_2O emissions decreasing by 48.7 per cent. Emissions of F-gases increased by 7.0 per cent.

20. An analysis of the drivers of GHG emission trends in each sector is provided in chapter II.B below. Table 3 provides an overview of GHG emissions by sector from 1990 to 2012.

Table 3

Greenhouse gas emissions by sector in the United Kingdom, 1990–2012

	GHG emissions (kt CO_2 eq)				*Change (%)*		*Share[a] by sector (%)*	
Sector	*1990*	*2000*	*2010*	*2012*	*1990–2012*	*2011–2012*	*1990*	*2012*
1 Energy	611 753.07	561 951.27	506 338.92	485 541.80	–20.6	4.3	78.1	82.8
A1 Energy industries	237 749.98	199 694.35	193 159.59	191 580.56	–19.4	6.4	30.3	32.7
A2 Manufacturing industries and construction	106 511.34	98 475.78	69 716.31	65 723.76	–38.3	0.6	13.6	11.2
A3 Transport	116 336.68	123 802.82	117 684.73	115 724.22	–0.5	–0.4	14.8	19.7
A4–A5 Other	115 816.52	120 587.30	113 829.04	101 493.63	–12.4	10.0	14.8	17.3
B Fugitive emissions	35 338.56	19 391.02	11 949.25	11 019.64	–68.8	–3.8	4.5	1.9
2 Industrial processes	54 246.52	31 249.23	26 551.05	24 973.31	–54.0	–1.6	6.9	4.3
3 Solvent and other product use	NE, NO	NE, NO	NE, NO	NE, NO	NA	NA	NA	NA
4 Agriculture	65 509.24	61 718.61	53 054.25	52 125.82	–20.4	–1.1	8.4	8.9
5 LULUCF	1 878.97	–2 092.66	–7 248.63	–6 978.39	–471.4	–6.8	0.2	–1.2
6 Waste	51 903.47	49 516.22	27 273.67	23 716.21	–54.3	–7.9	6.6	4.0
GHG total with LULUCF	**785 291.27**	**702 342.67**	**605 969.26**	**579 378.74**	**–26.2**	**3.1**	**NA**	**NA**
GHG total without LULUCF	**783 412.30**	**7044 35.33**	**613 217.89**	**586 357.13**	**–25.2**	**3.0**	**100.0**	**100.0**

Source: The United Kingdom's 2014 GHG inventory submission, version 1.2.

Note: The changes in emissions and the share by sector are calculated using the exact (not rounded) values and may therefore differ from values calculated with the rounded numbers provided in the table.

Abbreviations: GHG = greenhouse gas, LULUCF = land use, land-use change and forestry, NA = not applicable, NE = not estimated, NO = not occurring.

[a] The shares of sectors are calculated relative to GHG emissions without LULUCF; for the LULUCF sector, the negative values indicate the share of GHG emissions that was offset by GHG removals through LULUCF.

3. National system

21. The United Kingdom provided in its NC6 a description of how its national system is performing the general and specific functions defined in the guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol (decision 19/CMP.1). The description includes all the elements mandated by decision 15/CMP.1. The NC6 also contains a reference to the description of the national system provided in the national inventory report of the 2013 annual submission. The ERT took note of the review of the changes to the

national system as reflected in the report of the individual review of the GHG inventory of the United Kingdom submitted in 2013.

4. National registry

22. In its NC6, the United Kingdom has provided information on the national registry in accordance with the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1. The ERT took note of the review of the changes to the national registry as reflected in the report of the individual review of the GHG inventory of the United Kingdom submitted in 2013.

23. In the NC6, the United Kingdom made a reference to chapter 14 of its 2013 annual submission where they described the changes, specifically due to the centralization of the European Union Emissions Trading System (EU ETS) operations into a single EU registry operated by the European Commission and called the Consolidated System of European Union registries (CSEUR). The CSEUR is a consolidated platform which implements the national registries in a consolidated manner and was developed together with the new EU registry.

24. The IDR/NC5 contains a recommendation by the ERT to the United Kingdom to include all the required information on the national registry. The ERT noted that the NC6 contains all the required information on the national registry; the ERT commends the United Kingdom for this improvement.

5. Domestic and regional programmes and/or legislative arrangements and procedures related to the Kyoto Protocol

25. The United Kingdom has reported in its NC6 comprehensive and well-organized information on domestic and regional programmes and/or legislative arrangements and procedures related to the Kyoto Protocol.

26. However, the ERT noted that the NC6 does not include information on institutional arrangements and decision-making procedures that it has in place to coordinate activities related to participation in the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol, including the participation of legal entities. The ERT recommends that the United Kingdom provide such information in its next NC.

27. The overall responsibility for climate change policymaking in the United Kingdom lies within the Department of Energy and Climate Change (DECC). DECC coordinates the United Kingdom's policy on climate change mitigation at official level through interdepartmental committees that it chairs. A Cabinet committee chaired by the Chancellor of the Exchequer (Minister of Treasury) makes decisions at the ministerial level. While some policies are under the direct responsibility of DECC, others are designed and implemented by other entities including: Her Majesty's Treasury; the Department for Transport; the Department for Environment, Food and Rural Affairs (Defra); the Department of Communities and Local Government; the Department for Business, Innovation and Skills; the Foreign and Commonwealth Office; the Forestry Commission; and the Department for International Development. In addition, the implementation of climate change policy is supported and/or enhanced by action taken by the Devolved Administrations in Scotland, Wales and Northern Ireland.

28. In terms of arrangements specific to the country, the implementation of the Kyoto Protocol is underpinned by the Climate Change Act (2008), which provides a long-term legally binding framework for institutions and PaMs to reduce GHG emissions. The act's carbon budgets set the emissions trajectory that ensures the 2050 target of reducing emissions by at least 80 per cent by 2050 relative to 1990 levels will be met. Each carbon budget covers a five year cycle over which GHG emissions in the country are limited to meet the 2050 target. The December 2011 carbon plan includes options for achieving the

first four carbon budgets that limit emissions to a trajectory consistent with the 2050 target. Further emission reduction efforts have been deployed with PaMs introduced with the 2013 electricity market reform (EMR) package.

29. The Climate Change Act also provides for a strong accountability system. The Government prepares ex ante impact assessments for policy design, and monitors and evaluates the implementation and effectiveness of PaMs in a systematic manner. Furthermore, the Committee on Climate Change (CCC), which is a (highly) specialized quasi-autonomous independent statutory body (legally mandated and publicly funded) using an evidence-based approach, advises the Government on the planning of the carbon budgets and on the policies to meet them. CCC also monitors and evaluates progress in meeting the carbon budgets and in reducing emissions to achieve the 2050 target, and makes recommendations to the Government on the way forwards in its annual report on progress to Parliament. The Government (DECC) also publishes a response to the CCC progress report outlining how it intends to implement the recommendations.

30. As part of the EU, which agreed upon a reduction in GHG emissions of 8 per cent below the base year level, the United Kingdom agreed to fulfil its commitments for the first commitment period of the Kyoto Protocol jointly with the other 14 EU countries. The United Kingdom's share of the 'burden-sharing agreement' was an emission reduction target of 12.5 per cent below the base year level over the 2008–2012 period. For the second commitment period from 2013 to 2020, the United Kingdom committed to the joint EU target to reduce GHG emissions by 20 per cent compared with the base year level.

31. The ERT noted that documentation on the Climate Change Act and the fulfilment of carbon budgets and information on legislative arrangements are publicly accessible on the Internet, and public consultations are held in the process of developing PaMs.

32. The United Kingdom provided in its NC6 a description of national legislative arrangements and administrative procedures that seek to ensure that the implementation of activities under Article 3, paragraph 3, and elected activities under Article 3, paragraph 4, of the Kyoto Protocol also contribute to the conservation of biodiversity and the sustainable use of natural resources. Forestry policy in the United Kingdom is the responsibility of the Devolved Administrations in Scotland, Wales and Northern Ireland, and of the United Kingdom Government in England; all have established policies for woodland creation, co-financed through the EU rural development programme. A strong regulatory framework continues to protect existing woodland from deforestation and degradation. The United Kingdom has developed a woodland carbon code. A revised United Kingdom forestry standard (UKFS) was published in November 2011, including a new guideline on forests and climate change. The requirement for climate change mitigation is embedded in the standard, which requires that "forest management should contribute to climate change mitigation over the long term through the net capture and storage of carbon in the forest ecosystem and in wood products". Meeting the requirements of the UKFS is a condition of grant aid, and also underpins both the woodland carbon code and forest certification under the United Kingdom's woodland assurance standard.

B. Policies and measures, including those in accordance with Article 2 of the Kyoto Protocol

33. The United Kingdom has provided in its NC6 comprehensive information on its package of PaMs implemented, adopted and planned in order to fulfil its commitments under the Convention and its Kyoto Protocol.

1. Policies and measures related to implementation of commitments under the Convention

34. In its NC6, the United Kingdom reported on its PaMs implemented, adopted and planned in achieving its commitments under the Convention. The United Kingdom provided information on PaMs by sector, identifying the gases covered by a PaM and providing descriptions of the principal PaMs. The United Kingdom has also provided information on how it believes its PaMs are modifying longer-term trends in anthropogenic GHG emissions and removals in accordance with the objective of the Convention. The NC6 contains a set of PaMs similar to those in the NC5, as well as some new ones. The ERT noted some inconsistencies in the names of PaMs between the textual description of PaMs in chapter 3 of the NC6 and in common tabular format (CTF) table 3 of the first biennial report (BR1) provided in annex 2 of the NC6. To enhance the transparency of its reporting, the ERT recommends that the United Kingdom report consistently the names of PaMs throughout its NCs and biennial reports (BRs).

35. The NC6 does not include some information required by the UNFCCC reporting guidelines on NCs. The ERT noted that in the textual description of PaMs and the summary tables provided in chapter 3, the United Kingdom reports PaMs by sector, but not subdivided by gas. The ERT recommends that the United Kingdom includes textual descriptions of how the PaMs affect specific gases.

36. In its NC6, the United Kingdom gave priority to those PaMs implemented, adopted and planned that provide the most significant contributions to its emission reduction efforts, including PaMs adopted and implemented at national, devolved administration and local level. The United Kingdom reported on its policy context and national targets and objectives set to implement its commitments under the Convention.

37. The ERT noted that national economic classification of sectors is used for reporting PaMs in NC6, as was the case in NC5. However, the United Kingdom includes a table that establishes the mapping between categories used in its NC6 and those used for reporting in the GHG inventory (Intergovernmental Panel on Climate Change (IPCC) categories). The ERT acknowledges that this mapping is useful, but to enhance the transparency of its reporting and the comparability with other Parties' NCs, the ERT encourages the United Kingdom to organize the reporting of PaMs according to the following sectors: energy, transport, industry, agriculture, forestry and waste management, as encouraged by the UNFCCC reporting guidelines on NCs, based on the IPCC categories.

38. The United Kingdom employs a wide set of PaMs that, in many cases, cover several sectors and gases and that are likely to interact with other PaMs covering the same sector(s) or gas (es). However, the NC6 did not provide information on how a PaM interacts with other PaMs or include a description of how PaMs complement each other in order to enhance overall GHG mitigation. The ERT encourages the United Kingdom to develop more detailed descriptions of how PaMs interact and complement each other at the national level.

39. In the NC6, the United Kingdom has not reported on the PaMs that potentially increase emissions. The ERT encourages the United Kingdom to include the information on how it identifies and deals with policies and practices that encourage activities leading to greater levels of GHG emissions than would otherwise occur.

40. The ERT noted that while changes in activity levels due to a PaM are provided in some cases, estimates of GHG emissions avoided by individual PaMs are not reported in the text or tables of the NC6 and there are no data about the mitigation effects in the agriculture and LULUCF sectors. However, the ERT acknowledges that a reference is made to CTF table 3 of the BR1 where quantitative estimates of GHG emissions avoided for 2005, 2010, 2011, 2015, 2020, 2025 and 2030 are provided for several PaMs. Where no

estimate is provided, the United Kingdom reported that the effect of a PaM has been included in the United Kingdom's 'with measures' emission projections but that since no specific 'without measures' counterfactual is available, the quantitative effect could not be reported. The ERT encourages the United Kingdom to explain in more detail the reasons for such cases and why it is not possible to distinguish the impacts of individual PaMs. If it is because of the interaction of several PaMs, the United Kingdom is encouraged to provide information about the collective effect of a group, or groups, of PaMs.

41. The United Kingdom reported information on the costs of PaMs for only some of the PaMs. However, costs are not systematically provided for individual PaMs, which makes it difficult to assess the cost of the whole set of implemented PaMs. During the review, the ERT received additional information on the costs and benefits of implemented PaMs. The United Kingdom is encouraged to report information on the costs of its PaMs in a more systematic manner in order to increase the transparency of its next NC. In a separate section, the United Kingdom provided information on PaMs no longer in place compared to those reported in the NC5, with a brief explanation of why they were discontinued.

42. The United Kingdom prepares ex ante impact assessments for policy design, and the Government and CCC monitor the implementation and effectiveness of PaMs in a systematic manner. The monitoring includes periodic evaluation of the progress in fulfilling the requirements of the current carbon budget.

43. During the review, the United Kingdom provided additional information, elaborating on the recent updates and developments for planned or implemented PaMs, PaMs at devolved administration level and coordination between different public actors, and monitoring and evaluation of PaMs and their effects. This information was instrumental in providing a more complete picture of the implemented and planned PaMs, and their drivers, additionality and anticipated effects. This additional information is provided below in the relevant sections.

44. The United Kingdom implemented part of the recommendations provided in the IDR/NC5. The ERT commends the United Kingdom for its improved reporting and for taking into consideration the recommendations made in the previous review report.

45. The ERT noted that the approach of setting five year carbon budgets as a framework for achieving mitigation is an innovative and replicable approach. In addition, the ERT sees a number of PaMs implementing the carbon budget, which involve interacting fiscal, regulatory and voluntary measures, as innovative and replicable.

2. Policy framework and cross-sectoral measures

46. The key climate and energy policy framework is the Climate Change Act of 2008. The act provides a long-term framework to reduce GHG emissions in five year carbon budget cycles. It provides the legally binding framework for institutions and PaMs that aim at reducing GHG emissions in the United Kingdom by 80 per cent by 2050 compared to the 1990 level. In December 2011, the Government published the carbon plan, which sets out four scenarios and proposals for achieving the emission reductions committed to in the first four carbon budgets (2008–2027).

47. At the EU level, the main framework guiding climate change policy is the EU 2020 climate and energy package, which sets targets for GHG emission reductions of at least 20 per cent below the 1990 levels for the EU as a whole and is linked to the implementation of the EU ETS and the effort-sharing agreement for the sectors not covered by the EU ETS. The sectors covered by the EU ETS (mainly CO_2 from power plants, energy-intensive industries and commercial airlines, N_2O from production of specific acids and perfluorocarbons (PFCs) from aluminium production) are required to reduce their GHG emissions by 21 per cent below the 2005 level by 2020. In the United Kingdom, the sectors

not covered by the EU ETS (mainly transport, buildings, small businesses and agriculture) are required to reduce their GHG emissions by 16 per cent over 2005–2020. The implementation of the EU 2020 climate and energy package is also linked to the 2009 EU renewable energy directive (RED) and the 2012 EU energy efficiency directive (EED).

48. The United Kingdom's Devolved Administrations of Scotland, Wales and Northern Ireland develop and implement complementary PaMs. The Scotland Climate Change Act 2009 sets mandatory targets to achieve at least a 42 per cent reduction from the 1990 level of GHG emissions by 2020 and an 80 per cent reduction by 2050, which includes Scotland's share of international bunker emissions. In 2013, the Scottish Government published a report setting out proposals and policies for meeting those targets and also established a new strategic priority, the transition to a low carbon economy, emphasizing the central importance of low carbon to Scotland's future economic success. The Northern Ireland programme for government (2011–2015) commits the Northern Ireland Executive to reduce GHG emissions by 35 per cent compared to the 1990 level by 2025, and a GHG emission reduction action plan was agreed in 2011 with the aim of achieving this target. Progress is monitored and reported annually by the Environment Minister to the Executive. The 2010 climate change strategy for Wales and associated delivery plans set out how the Welsh Government will act and work with partners to reduce GHG emissions by 3 per cent year-on-year in areas of devolved competence, meet a target to reduce all GHG emissions in Wales by 40 per cent relative to the 1990 level by 2020, and support effective adaptation to a changing climate. Table 4 provides a summary of the reported information on the PaMs of the United Kingdom.

Table 4
Summary of information on policies and measures reported by the United Kingdom

Sectors affected	*Key policies and measures with start years of implementation*	*Estimate of mitigation impact (kt CO_2 eq)*
Policy framework and cross-sectoral measures		
	Climate Change Act (2008)	
	Carbon plan (2011)	
	European Union Emissions Trading System (2005)	
Energy		
Energy supply	New energy supply policies	73 113[a]
	Electricity market reform (2013), including contracts for difference (2017), capacity market (2017), carbon price floor (2013) and emissions performance standards (2009)	
	Carbon capture and storage (2017)	
Renewable energy sources (cross-cutting)	Renewables obligation (2002)	NE
	Renewable energy strategy (2009)	
	Renewable transport fuels obligation order (2007)	NE
	Feed-in tariffs scheme for micro-/small-scale renewable technologies (2010)	NE
	Renewable heat incentive (2011)	5 631
Energy efficiency (cross-cutting)	Energy efficiency strategy (2012)	NE
	National energy efficiency action plan (2014)	NE
	Energy efficiency obligation schemes	NE
	Energy audits and management systems	NE

Sectors affected	*Key policies and measures, with start years of implementation*	*Estimate of mitigation impact (kt CO_2 eq)*
	Smart metering and billing	NE
	Energy saving opportunity scheme (2014)	NE
	Energy efficiency commitment phases 1–2 (2002)	2 941
Residential and commercial sectors	Buildings regulations part L (2002, 2006) including 2005 condensing boiler update	10 421
	Building regulations part L (2010)	5 849
	Green deal and energy company obligation (2012)	3 906
	National products policy (standards for energy-using products) (2009, 2013)	8 951
	Smart metering (2014)	2 809
	Carbon emission reduction target uplift and extension (2011)	1 700
Transport	Car policies (European Union new car CO_2 emission targets) (2012)	7 510
	Biofuels policy (2013)	4 215
	Light goods vehicles policies (2012)	1 073
	Heavy goods vehicles policies (2012)	1 318
Industrial sectors and processes	Climate change agreements	NE
	Industrial emissions directive (2016)[a]	
	Electricity demand reduction	NE
	Enhanced capital allowances	NE
	Ozone depleting substances regulation (2001)	NE
	Fluorinated greenhouse gas regulation (2009)	NE
Agriculture	English agriculture sector greenhouse gas action plan (2010)	3 200
	Nitrates action plan (2013)	NE
Forestry and LULUCF	Revised United Kingdom forestry standard (2011)	NE
	Rural development programmes (2007)	NE
	Forestry Act felling licence regulations and environmental impact (forestry) regulations (1999)	NE
Waste management	Landfill tax (2009)	NE

Note: The estimates of mitigation impact given for some measures are avoided annual emissions of carbon dioxide or carbon dioxide equivalent in for 2020.

[a] For combined measures (electricity market reform, carbon capture and storage, renewable energy strategy and industrial emissions directive).

3. Policies and measures in the energy sector

49. In 2012, emissions from the energy sector accounted for 82.8 per cent of total GHG emissions (485,541.80 kt CO_2 eq) and had declined by 20.6 per cent since 1990. This drop in emissions was mainly due to a shift from coal-fired power generation towards electricity generation based on natural gas and renewable energy, economic changes leading to a fall in energy demand as well as energy efficiency standards.

50. ***Energy supply***. There is a decreasing trend of emissions in the energy supply sector, for which there are several reasons. Overall, between 1990 and 2012, total primary energy supply decreased by 6.7 per cent. Concurrently, there has been a shift towards the use of

combined cycle gas turbine stations rather than conventional steam stations burning coal or oil. Also, the recent economic recession has reduced energy demand. In addition, in recent years, implemented PaMs promoting low carbon technologies have played an increasingly important role.

51. EMR (2013) provides a comprehensive new framework of policies that aims to promote the transition to an electricity market where low carbon technologies compete on cost. EMR provides support for low carbon technologies in the short to medium term in order to have a competitive market in the long term for all technologies without direct injection of funds by the Government. EMR aims to attract investment in low carbon electricity generation while continuing to ensure security of supply and lowest possible cost. EMR aims at enabling renewable energy sources, new nuclear generation capacity, and carbon capture and storage (CCS) by implementing the following four key measures:

(a) Contracts for difference to stimulate investment in low carbon technologies by providing predictable revenue streams that encourage investment and make it easier and cheaper to secure finance;

(b) Capacity market (payments for reliable sources of electricity generation capacity) to ensure security of energy supply;

(c) Carbon price floor (CPF) to provide a clear economic signal. The CPF, which has been in force since 1 April 2013, amends the existing climate change levy (CCL) regime, a system of taxes on business use of energy, by applying rates of CCL based on the CPF to gas, solid fuels and liquefied petroleum gas used in electricity generation. The CPF initial value was at around pounds sterling (GBP) 16/t CO_2 in 2013 and will follow a straight line increase to GBP 30/t CO_2 in 2020, rising to GBP 70/t CO_2 in 2030;

(d) Emission performance standards to prevent the construction of the most carbon intensive ways of generating electricity.

52. ***Renewable energy sources***. The EU RED requires the United Kingdom to obtain 15 per cent of its total energy, and 10 per cent of energy used in transport, from renewable energy sources by 2020. To contribute to the achievement of these targets, the United Kingdom implemented the 2013 EU fuel quality directive (FQD), which requires fuel and energy suppliers, mainly for land-based transport, to reduce the GHG emission intensity (emissions per unit energy) of the fuel and energy they supply by 6 per cent by 2020. Both RED and FQD were transposed into domestic law through amendments to the renewable transport fuel obligation (RTFO) order of 2007. RTFO requires suppliers who supply at least 450,000 litres of fuel annually for road transport to demonstrate that at least 4.75 per cent of their fuels come from renewable energy sources. Only biofuels meeting EU mandatory sustainability criteria are counted towards RED and FQD targets, and receive renewable transport fuel certificates under RTFO.

53. The renewables obligation scheme (2002) is the main mechanism of the United Kingdom to incentivize the deployment of large-scale renewable electricity generation. It was instrumental in increasing the level of renewable electricity generation from 2.9 per cent in 2002 to 14.9 per cent in 2013. The scheme was reviewed in 2012–2013, resulting in the reduction of the lifetime cost of the scheme. The scheme will close for new entrants in 2017.

54. Biomass and biogas combustion, solar thermal and deep geothermal installations, and ground and water source heat pumps (limited to installations below 200 kW (thermal) for biogas combustion and solar thermal), as well as biomethane injection into the natural gas grid, are eligible for support under the renewable heat incentive (RHI). In the non-domestic scheme between November 2011 and September 2014, 5,559 installations participated, representing 1 GW of installed capacity and almost GBP 80 million in tariff

payments made for 1.6 TWh of heat generated. The domestic part of RHI, launched in April 2014, is the main tool for decarbonizing heating of buildings and is designed to bridge the gap between the cost of fossil fuel and renewable heat alternatives through financial support for owners of participating installations.

55. The feed-in tariff scheme for microgeneration and small-scale renewable technology (up to 5 MW per installation) was introduced in 2010, and is expected to support 1.9 million installations by 2020. As at the end of August 2014, 580,000 installations (2.85 GW total capacity) were registered, predominantly consisting of solar photovoltaic systems.

56. ***Energy efficiency***. In response to the EU EED, the United Kingdom submitted to the European Commission in April 2013 its non-binding target to achieve an 18 per cent reduction in final energy consumption relative to the 'business as usual' projection made in 2007 (equivalent to a 20 per cent reduction in primary energy consumption). This is equivalent to a level of 129.2 Mtoe for final energy consumption on a net calorific value basis. In addition, from 1 January 2014 to 31 December 2020, EU member States are required to achieve a binding final energy consumption target equivalent to year-on-year annual reductions of 1.5 per cent in annual energy sales to final consumers relative to the average final energy consumption between 2010 and 2012. On this basis, the United Kingdom's target for cumulative energy savings during 2014–2020 relative to the 2010–2012 reference level has been set at 324 TWh.

57. To implement its 2012 energy efficiency strategy, the United Kingdom published, in April 2014, its national energy efficiency action plan, which includes measures to be implemented to achieve the targets of the EU EED. The key cross-cutting measures include:

(a) Energy efficiency obligation schemes: a total of 19 policy measures have been identified to contribute towards the target, including three energy efficiency obligations (the carbon emission reduction target, the community energy saving programme and the energy company obligation). In total, quantifiable savings equivalent to 467 TWh have been identified against the target of 324 TWh. The total energy saving that will be achieved by supplier obligations is 167 TWh;

(b) Energy audits and management systems: measures requiring energy measurement and/or energy auditing such as the carbon reduction commitment (CRC) energy efficiency scheme for large private and public organizations (see para. 65 below), mandatory GHG reporting for all United Kingdom incorporated companies listed on major stock markets and climate change agreements for energy-intensive industries (see para. 72 below);

(c) Smart metering and billing: second smart meter equipment technical specifications will ensure meters are capable of providing customers with near real-time information on their energy usage and storing up to 24 months of consumption data, as well as up to three months of half-hourly export data.

58. The energy savings opportunity scheme will place a new legal requirement on large enterprises to conduct energy audits that meet the requirements of the EED. This scheme will be mandatory for all large undertakings in the United Kingdom, which are estimated to number around 7,300.

59. Finally, the energy efficiency commitment phase 1 required all electricity and gas suppliers with 15,000 or more domestic customers to achieve a combined energy saving of 62 TWh by 2005 by assisting their customers to take energy efficiency measures in their homes. With phase 2, energy suppliers with more than 50,000 domestic customers were required to deliver a total of 130 TWh lifetime energy use reductions in households, primarily through the promotion of energy efficiency measures.

60. ***Residential and commercial sectors***. In the United Kingdom, around 45 per cent of CO_2 emissions come from heating and cooling of buildings (18 per cent from non-domestic buildings and 27 per cent from domestic buildings). To reduce these emissions, the United Kingdom Government and the Devolved Administrations pursue a similar agenda and have adopted various minimum performance standards through building regulations applicable to new buildings and when new work is carried out to existing buildings.

61. A financing mechanism is available via the green deal framework, which enables accredited green deal providers to offer residential and non-residential consumers a range of energy efficiency improvements at no upfront cost through lending. The costs of the measures will be paid back over time through energy bills, and payments are supposed to be less than the savings through reduced energy bills.

62. The national products policy sets minimum energy efficiency standards for appliances and equipment, and requires labelling under the EU energy labelling (2010) and ecodesign (2009) directives. Minimum energy efficiency standards have so far been agreed for a range of products including washing machines, refrigerators and televisions, while energy efficiency labels have to be displayed in shops to help consumers to choose more efficient products.

63. Starting in 2014, smart meters will be provided to residential and small business consumers, allowing near real-time information on energy consumption and enabling them to monitor and manage their energy consumption, save money and reduce carbon emissions.

64. The energy company obligation (a successor to the energy efficiency commitment described in para. 59 above) requires energy suppliers to deliver energy efficiency improvements for domestic consumers. It has subtargets for hard-to-treat homes, for rural and low-income areas, and for heating cost reductions in low-income and vulnerable households.

65. The CRC energy efficiency scheme for large private and public sector organizations (see para. 57 above) targets emissions not covered by climate change agreements (see para. 72 below) or the EU ETS. Under the scheme, it is mandatory to monitor energy use, report associated emissions and purchase allowances to cover those emissions.

66. ***Transport sector***. Transport sector emissions decreased by 0.5 per cent from 116,336.68 kt CO_2 eq in 1990 to 115,724.22 kt CO_2 eq in 2012. After peaking in 2007 at 12.6 per cent above the 1990 level, GHG emissions from road transport slightly decreased, partly owing to improvements in the average fuel efficiency of vehicles and also owing to the economic recession beginning in 2008. While the number of vehicles in the United Kingdom increased by about 40 per cent during the period 1990–2012, the average fuel efficiency of the fleet overall increased enough to allow for a fall in emissions. The PaMs in the transport sector aim to reduce vehicle emissions by improving the fuel efficiency of vehicles, increasing the use of sustainable biofuels meeting the EU criteria and promoting behavioural changes related to car maintenance and driving habits that lead to fuel savings.

67. The combination of EU CO_2 standards for passenger cars and light commercial vehicles with fiscal measures has proven very successful in reducing average new car emissions, in a car fleet where the average car age is eight years old. The new car CO_2 regulation sets targets of 130 g CO_2/km by 2015 and 95 g CO_2/km by 2020. It is foreseen that in the United Kingdom's road transport sector between 2010 and 2030, traffic (measured in vehicle-miles) will increase by 28 per cent, but that road transport CO_2 emissions will drop by 19 per cent.

68. For other, mainly freight, vehicle types, the United Kingdom implements the European Commission regulation 661/2009 through its light goods vehicle policy with

targets of 175 g CO_2/km by 2017 and 147 g CO_2/km by 2020. The heavy and light goods vehicle policies both set minimum requirements for tyres, as well as their labelling, with regard to rolling resistance and wet grip.

69. The biofuels policy, already described above in paragraph 52 above, implements the EU FQD and RED, which provide the frameworks for regulating biofuel use in road transport.

70. The Government has placed emphasis on building a market for ultra-low emission vehicles with a package of measures supported by GBP 500 million to 2020. Proposed measures for the implementation of the concept include support for the development of the necessary infrastructure of ultra-low emission car use, as well as grant schemes for consumers.

71. As part of its strategy to improve public transport as an alternative to private road transport, the Government is investing over GBP 9 billion in the rail network between 2014 and 2019. There are also experiments with battery-powered engines that aim to replace diesel engines on railway lines with the least traffic.

72. ***Industrial sectors*** The climate change agreements scheme (see para. 57 above) targets energy-intensive industries, to which it offers a partial rebate from CCL on energy use, conditional on the participating industry not exceeding a set emissions cap. From 2013, the rebates are 90 per cent electricity and 65 per cent for other energy sources. It is anticipated that industries will meet these caps as a result of low economic growth and take-up of other measures. The 2013–2023 period of the scheme involves more than 9,000 sites. The scheme aims to reduce CO_2 emissions by 19,000 kt between 2013 and 2020.

73. A pilot scheme on electricity demand reduction was introduced in June 2014, with at least GBP 20 million of funding, and will use an auction to allocate financial incentives to the most cost-effective projects to install equipment that offers lasting electricity savings. This offers the Government an alternative to providing payments to support electricity generation capacity in the forthcoming capacity market. The scheme aims to provide incentives to overcome the capital constraints barrier.

74. The enhanced capital allowances scheme allows companies to write off 100 per cent of the cost of new energy saving plant or machinery against the business taxable profits in the financial year that the purchase was made.

4. Policies and measures in other sectors

75. ***Industrial processes***. GHG emissions from the industrial processes sector (including solvent and other product use) decreased from 54,246.52 kt CO_2 eq in 1990 to 24,973.31 kt CO_2 eq in 2012. The largest emission reductions were from the chemical manufacturing industry, including most notably the abatement of N_2O emissions from the manufacture of nitric acid and adipic acid in response to integrated pollution prevention control and the EU ETS. In addition, the United Kingdom recently ended its adipic acid production. Industrial process emissions of CO_2 fell in 2010 and 2011 owing to the economic recession in the energy-intensive heavy industries.

76. The 2001 EU large combustion plant directive (LCPD) set limits on emissions of sulphur dioxide, nitrogen oxides, and dust from combustion plants with a thermal capacity of 50 MW or greater. While about 100 plants in the United Kingdom opted to participate in the National Emissions Reduction Plan, in which each receives a transferrable annual mass emission allowance, a few other plants decided not to limit their emissions subject to limiting their operating hours to no more than 20,000 hours after 1 January 2008 and to close by 31 December 2015. From 1 January 2016, the LCPD will be replaced by more stringent provisions set out in chapter III of the 2010 EU industrial emissions directive.

Those provisions already apply in respect to any plant newly permitted since 7 January 2013.

77. Emissions of F-gases increased by 7.0 per cent between 1990 and 2012. The United Kingdom has been implementing the ozone depleting substances regulation (2001), which bans chlorofluorocarbon and halon use, and hydrochlorofluorocarbon use will be banned from 2015. The United Kingdom recognizes in its NC6 that this measure indirectly reduced emissions of hydrofluorocarbons (HFCs) as a manufacturing by-product, but increased their use as a substitute.

78. The fluorinated GHG regulation (2009) controls, prevents and reduces emissions of F-gases through recovery, leak reduction and repair. The regulation also requires mandatory certification to work with F-gases. During the review week, the ERT was informed about an upcoming F-gas regulation at the EU level, which anticipates reduction of F-gas emissions across the EU by two thirds by 2030 compared with the 2005 level.

79. The ERT was informed that the United Kingdom foresees the introduction of industrial CCS after 2025.

80. ***Agriculture***. In 2012, GHG emissions from agriculture accounted for 8.9 per cent of total emissions. Between 1990 and 2012, GHG emissions from the agriculture sector decreased by 20.4 per cent from 65,509.24 kt CO_2 eq to 52,125.82 kt CO_2 eq, mainly owing to decreasing animal numbers and fertilizer use, plus expanded forestry areas and a tendency towards less-intensive agriculture.

81. The United Kingdom Government and the Devolved Administrations have based their approach to reducing emissions from agriculture on voluntary measures by the industry. As an exception, the nitrates action plan (2013) is a regulatory measure that implements the 1991 EU nitrates directive supported by advice from the Government of the United Kingdom on promoting better manure management, chemical nitrogen fertilizers and other nitrogen-containing materials spread onto land.

82. There is an English, industry-led agriculture sector GHG action plan (2010) in place to deliver reductions in annual emissions of about 3,000 kt CO_2 eq in England from the 2007 level by 2022. This will be scaled up to 4,500 kt CO_2 eq with the contributions of the three Devolved Administrations. Measures in the plan are voluntary and focus on provision of information about less carbon intensive farming practices.

83. The ERT was informed that restoration of peat bogs remains a challenge, but the issue is to be reviewed in the framework of the next policy review in 2016, along with the need for further actions in the field of agriculture.

84. ***LULUCF***. Between 1990 and 2012, GHG emissions from LULUCF decreased from a net source of 1,878.97 kt CO_2 eq to net removals of 6,978.39 kt CO_2 eq. The trend is mainly driven by the change of the age structure of the forest stock. In the future the United Kingdom projects a reduction of the net sink due to ageing of forests and associated harvesting.

85. The United Kingdom Government and the Devolved Administrations have each developed a policy framework to reduce all GHG emissions from the forestry and land management sector, largely based on voluntary measures and support schemes. The revised UKFS (2011) is a regulatory and information measure that aims at enhancing removals and reducing emissions through woodland creation and sustainable forest management. The revised standard consists of an updated national standard for sustainable forest management, which includes a new guideline on climate change adaptation and mitigation.

86. Rural development programmes (2007) for England, Scotland, Wales and Northern Ireland are being implemented. The programmes deliver grants for afforestation (woodland

creation), co-financed with expenditure under the EU rural development regulation for 2007–2013.

87. Finally, the 1999 Forestry Act sets a regulatory framework that controls felling, only allows deforestation for purposes of nature conservation and prevents afforestation of deep peat.

88. ***Waste management***. Between 1990 and 2012, GHG emissions from the waste sector decreased by 54.3 per cent, from 51,903.47 kt CO_2 eq to 23,716.21 kt CO_2 eq. The change was mainly driven by policies implemented in accordance with the waste hierarchy (prevention > reuse > recycling > recovery > disposal), which is a legal requirement of the 2008 EU waste framework directive. The United Kingdom waste policy contributes to emission reductions via five routes: reductions in CH_4 emissions from landfills; emission reductions from more efficient use of materials; waste prevention; reuse and recycling; and energy recovery from waste, which offsets fossil fuel energy generation elsewhere in the economy. CH_4 emissions from biodegradable waste in landfills alone account for about 40 per cent of all CH_4 emissions and 3 per cent of all GHG emissions. A combination of permit conditions and financial incentives for capturing CH_4 from landfills and anaerobic digestion has driven investment to significantly increase capture of CH_4 at landfill sites, rising from 11 per cent in 1990 to 59 per cent in 2012.

89. Consistent with the 1999 EU landfill directive, the United Kingdom's Government and Devolved Administrations have published waste strategies aiming to reduce the quantity of waste produced and to increasingly recover value from it. The strategies also set targets for reducing the amount of waste sent to landfills and to increase the amount of recycling or composting. The United Kingdom's landfill tax encourages diversion of wastes from landfill, as well as waste prevention through an increase in the cost of disposal.

90. Food waste has been proposed as one of the priority waste streams under the waste prevention programme. Based on a voluntary approach and an awareness campaign, it is foreseen that supply chain food and packaging waste is to be reduced by 20 per cent during 2005–2015.

5. Policies and measures related to implementation of commitments under the Kyoto Protocol

91. The United Kingdom reported in its NC6 on its package of PaMs adopted, implemented and elaborated in achieving its commitment under the Kyoto Protocol. The NC6 includes information on how the United Kingdom promotes and/or implements the decisions of the International Civil Aviation Organization to limit emissions from aviation. The NC6 does not include information on how the United Kingdom promotes and/or implements International Maritime Organization (IMO) decisions to limit or reduce emissions not included in the Montreal Protocol from marine bunker fuels. During the review, the ERT received information regarding the United Kingdom's accounting of maritime emissions. The ERT reiterates the recommendation made in the previous review report that the United Kingdom report information on how it promotes and implements IMO decisions to limit emissions from marine bunker fuels in its next NC.

92. In its NC6, the United Kingdom reported information on how it strives to implement PaMs under Article 2 of the Kyoto Protocol in such a way as to minimize adverse effects, including the adverse effects of climate change and effects on international trade and social, environmental and economic impacts, on other Parties, especially developing country Parties. Further information on how the United Kingdom strives to implement its commitments under Article 3, paragraph 1, of the Kyoto Protocol in such a way as to minimize adverse social, environmental and economic impacts on developing country

Parties, as reported in its 2014 annual submission under Article 7, paragraph 1, of the Kyoto Protocol, is presented in chapter III.B below.

93. The NC6 underlines that the United Kingdom is funding adaptation programmes worth over GBP 800 million, working with the poorest countries in the sectors that are most important to the livelihoods of people living in poverty and who are vulnerable to climate change.

C. Projections and the total effect of policies and measures, including information on supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17 of the Kyoto Protocol

94. In its NC6, the United Kingdom presented well-organized information on the projections of its GHG emissions up to 2030. The projections reported in the NC6 were based on the updated energy and emission projections (UEP) 2013 that were published in September 2013. The NC6 contains a detailed 'with measures' scenario and also briefly refers to a scenario without the PaMs adopted between 2009 and 2013. The United Kingdom prepares new projections on an annual basis. Additional background information on the projections was received during the review. Also during the review, the United Kingdom informed the ERT that new updated projections would be completed within one week; these updated projections were shared with the ERT after the review.

1. Projections overview, methodology and key assumptions

95. The GHG emission projections provided by the United Kingdom in the NC6 include a 'with measures' scenario for 2015, 2020, 2025 and 2030, presented relative to actual inventory data for 1990, 1995, 2000, 2005, 2010 and 2011. Projections are presented on a sectoral basis, using the same sectoral categories as those used in the PaMs section and on a gas-by-gas basis for the following GHGs: CO_2, CH_4, N_2O, PFCs, HFCs and sulphur hexafluoride (treating PFCs and HFCs collectively in each case). Projections are also provided in an aggregated format for each sector, as well as for the national total, using global warming potential values. Emission projections related to fuel sold to ships and aircraft engaged in international transport were reported separately and not included in the totals.

96. In its NC6, the United Kingdom provided the scenario definition used for its projections, as follows: the 'with measures' scenario covers PaMs for which funding has been agreed and decisions on policy design are sufficiently advanced, that is, the scenario includes all implemented and adopted PaMs. A scenario without the PaMs adopted between 2009 and 2013 was also developed to quantify the effect of PaMs (see para. 117 below). The NC6 includes no details on sectoral emissions or individual gases for this scenario. The ERT encourages the United Kingdom to provide complete coverage of GHGs and sectors for a 'without measures' scenario in its next NC.

97. The United Kingdom reported on the methodology used for the projections in the NC6. It reported on the main differences in the projections compared to the NC5, namely that: additional PaMs have been added; the impacts of some PaMs have been revised; and there are revised prices of fossil fuels and lower economic growth. Furthermore, additional information was provided during the review, with supporting documentation, on a variety of changes to the methodology compared to the NC5. Projections of the United Kingdom's energy-related emissions have been derived from the DECC energy and emission projections (EEP) model, which consists of several interlocking submodels. Major changes since the NC5 include the change towards a market-based model of electricity generation and investment, rather than one using cost minimization. The United Kingdom also moved

to a new model of industry subsector growth, as the independent forecasts previously used became unavailable.

98. The new model links economic growth in the United Kingdom subsectors to global growth, effective exchange rates and long-term trends. The United Kingdom also has a new industry subsector fuel shares model. Furthermore, demand equations for fuel use in the residential, commercial and public sectors have all been re-estimated. Another change is that energy-related emissions equations for the non-GHGs have been updated. The waste projections model underwent a significant change to include more details on landfills. Changes to the waste model resulted in significantly decreased CH_4 emissions across the time series. The LULUCF sources and sinks in the 2014 updated projection are now based on the CARBINE model for estimating forest carbon stocks, which models all the United Kingdom's forests, instead of just the post-1920 forests. As a consequence of this change, the projected carbon sink is estimated to be much larger than in previous projections. In addition, uncertainty analysis through Monte Carlo simulation has been introduced, initially using reduced form equations and more recently a full FEP model simulation. The changes to the methodology better reflect causal relationships that drive GHG emissions and introduce more detail. Efforts to better project emissions are linked to the United Kingdom's policy cycle, which includes continuous improvements in evidence-based monitoring and reporting.

99. For the preparation of the scenarios, the United Kingdom used updated assumptions for the period 2015–2030, following the economic and demographic assumptions and projections produced for the United Kingdom's Government by the Office for Budget Responsibility for the March 2013 budget. For the NC6, the GDP growth rate has been set to vary between 2.3 and 2.8 per cent per year, with an average of 2.5 per cent over the period 2015–2030. Projected population growth is relatively high in the United Kingdom (0.4–0.7 per cent per year), which contributes to the economic growth figures. The oil price is projected at USD 113–135 per barrel[5] between 2015 and 2030. The coal price is projected to be at USD 104/t until 2015 and then increase to USD 123/t in 2020 and remain constant. The EU ETS carbon price, which applies to industry and services, is projected to increase from GBP 3.7/t CO_2 in 2015 to GBP 6.2/t CO_2 in 2030. The CPF (see para. 51 above), which applies to the electricity supply sector, will increase from GBP 19.0/t CO_2 in 2015 to GBP 32.7/t CO_2 in 2020 and GBP 76.2/t CO_2 in 2030. At the time of publication of the NC6 (early 2014), these assumptions for the period 2015–2030 provided a reasonable basis for the projections, although the coal price trend is relatively high compared to current and forward prices. However, some of these prices, in particular, the oil prices, have significantly decreased since then to about USD 55 per barrel (early January 2015). The ERT notes that this would likely change the projections results on the 2020 horizon.

2. Results of projections

100. The United Kingdom's Kyoto Protocol target for the first commitment period was to reduce its emissions by 12.5 per cent below the base year. The average annual emission level was established at 682,416.13 kt CO_2 eq per year for the period 2008–2012. For the same period, the United Kingdom's average annual GHG emissions is 603,447.31 kt CO_2 eq or 22.6 per cent below the base year; therefore, the United Kingdom is expected to meet its first commitment period target and does not plan to use units from the Kyoto Protocol mechanisms for compliance (the United Kingdom does, however, plan to account for LULUCF activities under Article 3, paragraph 4, of the Kyoto Protocol).

[5] Prices in this paragraph are in constant 2013 GBP. See common tabular format table 5 of the first biennial report of the United Kingdom, available at <http://unfccc.int/files/national_reports/biennial_reports_and_iar/biennial_reports_data_interface/application/pdf/gbr_2014_v3.0_formatted.pdf>.

101. For the second commitment period of the Kyoto Protocol, the United Kingdom and the other EU member States are to jointly achieve a 20 per cent emission reduction compared to the 1990 base year level during the period 2013–2020. At the time of the review, national targets for EU member States for the second commitment period of the Kyoto Protocol had not yet been decided.

102. In contributing to meeting the target for the EU Kyoto Protocol second commitment period and the quantified economy-wide emission reduction target under the Convention by 2020, the United Kingdom aims to achieve emission reductions in sectors covered by the EU ETS and sectors not covered by the EU ETS. Because emissions from sectors covered under the EU ETS are regulated by EU legislation, there is no requirement to define a national target for these emissions.

103. Within the context of the implementation of the effort-sharing decision (ESD), the EU as a whole has a collective target of reducing emissions not covered by the EU ETS by 10 per cent by 2020 compared with the 2005 level. As of 2013, these emissions are regulated by member State specific targets, determined based on average emissions from 2008 to 2010 (excluding emissions and removals from LULUCF). In the United Kingdom, this translates into a 16 per cent reduction in emissions not covered by the EU ETS by 2020 below the 2005 level, or a level for these emissions of 319,800 kt CO_2 eq in 2020. Considering the existing and planned PaMs, the United Kingdom reported that it expects to meet the target and does not plan to use the Kyoto Protocol market-based mechanisms or accounting for LULUCF activities for compliance.

104. Overall, the United Kingdom's reported projections for 2020 show a decreasing emission trend. Total emissions in 2020 are expected to be at a level that is 43.4 per cent below the 1990 base year level in the 'with measures' scenario. In 2030, they are projected to be 48.7 per cent below the 1990 base year level. On a gas-by-gas basis, the United Kingdom reported that CO_2 emissions in 2011 (start year for projections) were 464,600 kt. According to the projections, CO_2 emissions in the 'with measures' scenario will decrease to 360,700 kt in 2020 and to 327,400 kt in 2030.

105. Projected non-CO_2 emissions in the 'with measures' scenario show a decrease in 2020 and a further decrease in 2030. While in 2011, non-CO_2 emissions were reported to be 91,800 kt CO_2 eq, they are projected to decrease to 78,200 kt CO_2 eq in 2020 and to 69,600 kt CO_2 eq in 2030. Emissions of CH_4 are projected to decrease from 42,000 kt CO_2 eq in 2011 to 36,200 kt CO_2 eq in 2020 and 31,300 kt CO_2 eq in 2030. Emissions of N_2O are projected to only slightly decrease from 34,200 kt CO_2 eq to 32,600 kt CO_2 eq in 2020 and 32,300 kt CO_2 in 2030. HFC emissions are projected to drop substantially from 14,700 kt CO_2 eq in 2011 to 8,600 kt CO_2 eq in 2020 and 5,200 kt CO_2 eq in 2030.

106. The United Kingdom has presented sector-by-sector projections. Energy supply sector emissions are expected to drop from 192,100 kt CO_2 eq in 2011 to 106,100 kt CO_2 eq in 2020 and 72,700 kt CO_2 eq in 2030. The drop until 2020 has three main reasons: the industrial emissions directive that implies that plants which have opted out of retrofitting pollution abatement equipment are limited as to their remaining operating hours and will close after 31 December 2015 (see para. 76); natural ageing and replacement of plants; and the less favourable economic position of the remaining coal-fired power capacity as a result of the carbon price support floor. Between 2020 and 2030, the reduction will be caused by continued replacement of conventional power generation by a combination of renewable energy sources, CCS and nuclear energy as a result of the EMR programme. Generation from renewable energy sources is projected to grow significantly over the full period, initially as a result of the incentives provided by the renewable obligation and later by the contracts for difference (see para. 51 above).

107. GHG emissions from businesses (excluding industrial process emissions) are projected to fall from 89,200 kt CO_2 eq in 2011 to 70,300 kt CO_2 eq in 2020 and 63,700 kt CO_2 eq in 2030. This decline is influenced by a range of implemented PaMs (see paras. 57–63, 65 and 72–74 above).

108. Residential GHG emissions are expected to increase compared to 2011. Emissions were 69,900 kt CO_2 eq in 2011 (although they were much higher – 90,200 kt CO_2 eq – in 2010), and are projected to grow to 78,000 kt CO_2 eq in 2020 and 84,900 kt CO_2 eq in 2030. The main drivers are the increasing population and the growing number of houses. It is noted that this projection assumes continuation of past average temperature patterns.

109. Emissions from transport are projected to decrease from 119,100 kt CO_2 eq in 2011 to 107,700 kt CO_2 eq in 2020 and 103,400 kt CO_2 eq in 2030. This decrease will take place mainly because of the increase in transport performance. More specifically, the reduction will be caused by a combination of EU standards and fiscal instruments that promote efficient vehicles, mandate greater use of biofuels and encourage electrically powered vehicles.

110. Agriculture emissions are expected to fall from 51,400 kt CO_2 eq in 2011 to 45,500 kt CO_2 eq in 2020 and 44,900 kt CO_2 eq in 2030. CO_2 emissions are expected to fall largely as a result of fewer emissions from mobile machinery. A modest decrease in CH_4 emissions will be driven by decreases in livestock numbers.

111. The United Kingdom provided ample information on sensitivity analyses. Four variants were provided: low and high fuel prices and low and high GDP growth rates. The assumptions and results of these sensitivity analyses have clearly been described in the NC6. The overall impact on GHG emissions ranges from emissions that are 2 per cent below and 2 per cent above the reference scenario emissions in 2030. Overall uncertainty has also been modelled by combining uncertainty in 10 key parameters including GDP, population, fossil fuel prices, annual temperatures and policy savings in a 500 run Monte Carlo simulation. The 95 per cent confidence interval in 2030 ranges from 8 per cent lower to 10 per cent higher GHG emissions than the reference projection. The Monte Carlo analysis indicated that the most important key factors affecting emissions were GDP, number of households, car efficiencies, population, efficiencies of heavy trucks, domestic winter degree days, steel production and efficiencies of vans.

112. The projected emission levels and information on the Kyoto Protocol targets and quantified economy-wide emission reduction target under the Convention are presented in table 5 and the figure. The United Kingdom is expected to achieve its second and third carbon budgets. To stay within its fourth carbon budget for the period 2023–2027 will require the introduction of additional PaMs. The CCC findings are largely in line with this projection.

Table 5

Summary of greenhouse gas emission projections for the United Kingdom

	Greenhouse gas emissions (kt CO_2 eq per year)	*Changes in relation to the base year[a] level (%)*	*Changes in relation to the 1990 level (%)*
Kyoto Protocol base year[b]	779 904.14	0.0	–0.4
Kyoto Protocol target for the first commitment period (2008–2012)	682 416.13	–12.5	–12.9
Kyoto Protocol target for the second commitment period (2013–2020)[c]	Not available yet		
Quantified economy-wide emission reduction target under the Convention[d]	Not available yet		

	Greenhouse gas emissions (kt CO2-eq per year)	*Changes in relation to the base year[a] level (%)*	*Changes in relation to the 1990 level (%)*
Inventory data 1990[b]	783 412.30	0.4	0.0
Inventory data 2012[c]	586 357.13	–24.8	–25.2
Average annual emissions for 2008–2012[c]	603 447.31	–22.6	–23.0
'Without measures' projections for 2020	–		
'With measures' projections for 2020[c]	438 900	–43.7	–44.0
'With additional measures' projections for 2020	–		
'Without measures' projections for 2030	–		
'With measures' projections for 2030[c]	397 100	–49.1	–49.3
'With additional measures' projections for 2030	–		

[a] "Base year" in this column refers to the base year used for the targets under the Kyoto Protocol, while for the target under the Convention it refers to the base year used for that target.

[b] The Kyoto Protocol base year level of emissions is provided in the initial review report contained in document FCCC/IRR/2007/GBR.

[c] The Kyoto Protocol target for the second commitment period (2013–2020) is a joint target for the European Union and its 28 member States and Iceland. The target is to reduce emissions by 20 per cent compared with the base year (1990) level. The target for sectors not covered by the European Union Emissions Trading System is 10 per cent for the United Kingdom under the European Union effort-sharing decision.

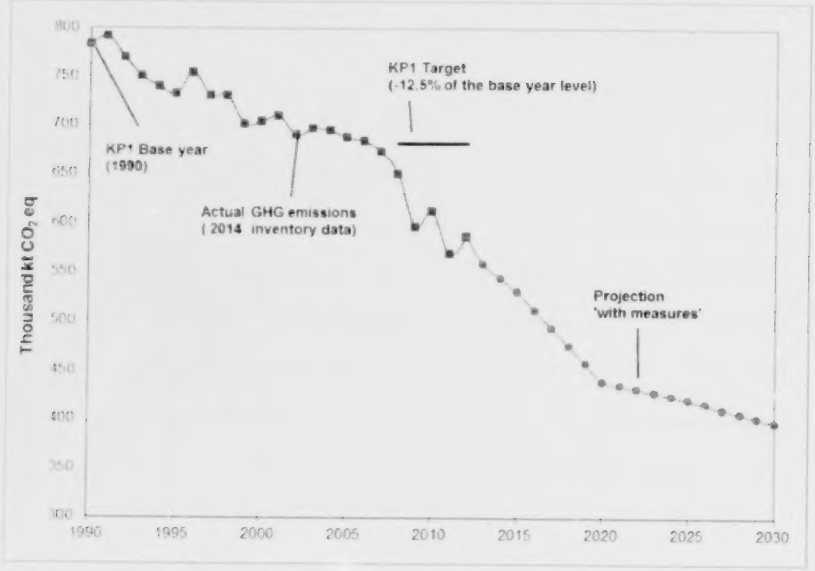
[d] Quantified economy-wide emission reduction target under the Convention is a joint target for the European Union and its 28 member States. The target is to reduce emissions by 20 per cent by 2020 compared with the base year (1990) level.

[e] The United Kingdom's 2014 greenhouse gas inventory submission; the emissions are without land use, land-use change and forestry.

[f] The United Kingdom's sixth national communication and/or first biennial report.

113. After the review, updated 2014 emission projections were completed and provided to the ERT. One of the changes was a lower price trajectory for coal. Compared to the 2013 emission projections, the 2014 projections lead to slightly higher emissions in 2015, the same emission level in 2020 and lower emissions in 2025 and 2030. Like the 2013 projections, the updated ones indicate that the United Kingdom is likely to meet its second and third carbon budgets, but further policy effort will be required to meet the fourth carbon budget. Compared with the 2013 projections, the emissions from sectors covered under the EU ETS are higher in the second carbon budget, and to a lesser extent in the third carbon budget, but lower in the fourth carbon budget. This is a consequence of more coal being burned in power stations in the short term as, under these fossil fuel price assumptions, coal becomes cheaper relative to gas. In the longer term, unabated coal-fired stations will close earlier than projected in the 2013 projections as their total operating hours are capped under the industrial emissions directive (see para. 76 above).

Greenhouse gas emission projections



Sources: (1) Data for the years 1990–2012: the United Kingdom's 2014 GHG inventory submission; the emissions are without land use, land-use change and forestry; (2) Data for the years 2012–2030: the United Kingdom's sixth national communication; the emissions are without land use, land-use change and forestry.

Abbreviations: GHG = greenhouse gas; KP1 = first commitment period of the Kyoto Protocol.

114. In the sectors not covered by the EU ETS, emissions from the residential sector are lower in the updated projections than in the 2013 projections. This is a consequence of lower projected emissions from households, higher projected effects (avoided emissions) from PaMs and the incorporation of Met Office weather projections. The latter project warmer winters, leading to a reduced need for winter heating and less GHGs emitted as a consequence.

115. Non-CO_2 GHG emissions are higher in the updated projections than in the 2013 projections, in particular, in the case of CH_4. This is because of inventory revisions to baseline emissions from agricultural waste and flaring from landfills. The impact of these changes on the projections diminishes gradually over time.

3. Total effect of policies and measures

116. In its NC6, the United Kingdom presents the estimated and expected total effect of PaMs adopted between 2009 and 2013. This information is presented in terms of GHG emissions avoided or sequestered in 2015, 2020, 2025 and 2030, resulting from the difference between the 'with measures' scenario and a scenario without the PaMs adopted between 2009 and 2013. In the total effects of PaMs, the United Kingdom includes only the effects on emissions sources not covered by the EU ETS, because reductions in emissions that are covered by the EU ETS can be traded. Notably, the effects of EMR are not included in the total effects of PaMs.

117. The United Kingdom provided information on the total effect of PaMs. However, this information was not complete, because the total effect of PaMs was not presented by

gas. Accordingly, the ERT recommends that the United Kingdom report this information in its next NC.

118. During the review, the United Kingdom provided additional information, elaborating on the effects of combinations of PaMs on GHG emissions. The assessment of these policies is undertaken according to DECC and Her Majesty's Treasury policy appraisal guidelines. The impact of each policy is assessed against a 'business as usual' scenario, that is, a projected scenario of GHG emissions in the absence of the policy under assessment.

119. DECC reported that the figures provided during the review may differ from those reported in the latest published impact assessment for the individual policies. There are three main reasons for these differences: policy savings are re-evaluated annually on the basis of new evidence, improved methodologies or announced changes to the policy; the treatment of policy overlaps used in the UEP differs from that used for policy appraisal purposes; and a revised assessment for each policy has been made of the extent to which a policy may affect the sectors covered by the EU ETS or the ESD separately.

120. The ERT noted that the information reported on the total effect of PaMs was not fully transparent for two reasons: it did not include the effect of PaMs on emissions sources covered by the EU ETS; and the information mixed two baseline approaches, which made it complicated to understand the effects. The United Kingdom is encouraged to improve the transparency of the reporting of the effects of PaMs by clarifying these two points in its next NC.

121. The United Kingdom reported in the NC6 that the total expected effects of PaMs adopted and implemented PaMs after July 2009 on emissions sources not covered by the EU ETS are 122,000 kt CO_2 eq in 2020 and 143,000 kt CO_2 eq in 2030. Additionally, in its UEP 2013, the United Kingdom reported that the total effects of all implemented and adopted PaMs on emissions sources not covered by the EU ETS are 189,200 kt CO_2 eq in 2020 and 229,300 kt CO_2 eq in 2025. According to the information reported during the review, PaMs in the transport sector will deliver the largest amount of avoided emissions, followed by the effect of PaMs in the residential and public services sectors. The most effective PaMs and drivers of avoided emissions are described in chapter II.B above. Table 6 provides an overview of the total effect of PaMs as reported by the United Kingdom.

Table 6
Projected effects of planned, implemented and adopted policies and measures in 2020 and 2030

Sector[a]	*Effect of implemented and adopted measures (kt CO_2 eq)*	*Relative value (% of 1990 emissions)*	*Effect of planned measures (kt CO_2 eq)*	*Relative value (% of 1990 emissions)*	*Effect of implemented and adopted measures (kt CO_2 eq)*	*Relative value (% of 1990 emissions)*	*Effect of planned measures (kt CO_2 eq)*	*Relative value (% of 1990 emissions)*
	2020				*2030*			
Energy supply	NA	NA	NA	NA	NA	NA	NA	NA
Business	NA	NA	NA	NA	NA	NA	NA	NA
Industrial processes	NA	NA	NA	NA	NA	NA	NA	NA
Transport	NA	NA	NA	NA	NA	NA	NA	NA
Residential	NA	NA	NA	NA	NA	NA	NA	NA
Public services	NA	NA	NA	NA	NA	NA	NA	NA
Agriculture	NA	NA	NA	NA	NA	NA	NA	NA
Land-use change and forestry (net)	NA	NA	NA	NA	NA	NA	NA	NA

Sector[a]	Effect of implemented and adopted measures ($kt CO_2 eq$)	Relative value (% of 1990 emissions)	Effect of planned measures ($kt CO_2 eq$)	Relative value (% of 1990 emissions)	Effect of implemented and adopted measures ($kt CO_2 eq$)	Relative value (% of 1990 emissions)	Effect of planned measures ($kt CO_2 eq$)	Relative value (% of 1990 emissions)
	2020				2030			
Waste management	NA	NA	NA	NA	NA	NA	NA	NA
Total	**122 000**	**15.6**	**NA**	**NA**	**143 000**	**18.3**	**NA**	**NA**

Source: United Kingdom's sixth national communication.

Note: The total effect of implemented and adopted policies and measures (excluding effects from land use, land-use change and forestry) is defined as the difference between the "with measures" scenario and a scenario without the PaMs adopted between 2009 and 2013. Only the effects on emissions sources not covered by the European Union Emissions Trading System are included.

Abbreviation: NA = not available.

[a] The sector categories are those used in the United Kingdom's sixth national communication.

4. Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17 of the Kyoto Protocol

122. The United Kingdom provided in its NC6 information on how its use of the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol is supplemental to domestic action, although it did not elaborate on supplementarity as such. The ERT noted that the United Kingdom does not plan to use the market-based mechanisms to meet its Kyoto Protocol target, as its emissions are well below the target.

D. Provision of financial resources and technology transfer to developing country Parties, including information under Articles 10 and 11 of the Kyoto Protocol

1. Financial resources, including "new and additional" resources and resources under Article 11 of the Kyoto Protocol

123. In its NC6, the United Kingdom provided information on provision of support required under the Convention and its Kyoto Protocol. The United Kingdom provided details on measures taken to give effect to its commitments under Article 4, paragraphs 3, 4 and 5, of the Convention as required by the UNFCCC reporting guidelines on NCs and under Article 11 of the Kyoto Protocol, as required by the "Guidelines for the preparation of information required under Article 7 of the Kyoto Protocol".

124. The United Kingdom reported in its NC6 that in 2010, it set up the international climate fund (ICF) with the goal of "tackling climate change and its impact on growth and poverty reduction". The United Kingdom indicated in the NC6 that it considers the amounts granted to ICF as being "new and additional". As such, the United Kingdom considers that funding of fast-start finance, directly taken from ICF, also consists of "new and additional" funding. In addition, during the review, the United Kingdom clarified that after the fifteenth session of the Conference of the Parties (United Nations Climate Change Conference in Copenhagen, Denmark, 2009), with its international cooperation being fully informed by climate change considerations, all funding additional to the level of funding in 2009 is to be considered "new and additional" finance. However, the NC6 does not include information required by the UNFCCC reporting guidelines on NCs, as it does not clarify how it has determined such resources as being "new and additional". The ERT reiterates the recommendation that the United Kingdom clarify how it has determined such resources as "new and additional" in its next NC.

125. The United Kingdom reported in its NC6 information on the assistance it has provided to developing country Parties that are particularly vulnerable to the adverse effects of climate change to help them meet the costs of adaptation to these adverse effects. In the NC6, the United Kingdom reported that as of September 2013, it was funding adaptation programmes from ICF worth over GBP 800 million, working with the poorest countries in sectors most important to the livelihoods of people who are living in poverty. The programmes funded targeted agriculture, disaster preparedness, water resources, infrastructure and urban development, coastal areas, ecosystems, social protection and health. The support provided also included building adaptation knowledge, capacity and institutions, as well as direct adaptation actions. The information is provided by year for 2011 and 2012, but not for 2010, in the broad areas of mitigation, adaptation and cross-cutting issues, and in total, but not by sector. The ERT encourages the United Kingdom to provide this information in its next NC using table 5 of the UNFCCC reporting guidelines on NCs, by completing the support by sector for each relevant year.

126. The United Kingdom provided in its NC6 information on financial resources related to the implementation of the Convention provided through bilateral, regional and other multilateral channels. In particular, the United Kingdom has provided information on its yearly contribution to the Global Environment Facility (GEF): GBP 66.5 million in 2010, GBP 73.5 million in 2011 and GBP 52.5 million in 2012. These represent the total contributions to the GEF, not just climate-specific elements. The United Kingdom has also provided figures on its financial support to multilateral financial institutions including regional development banks and specialized United Nations bodies. However, these figures are only provided for 2011 and 2012. The ERT encourages the United Kingdom to provide this information in its next NC for each relevant year using table 4 of the UNFCCC reporting guidelines on NCs.

127. In 2010, the United Kingdom set up ICF as the main mechanism for delivering financial support for climate change activities. A budget of GBP 2.9 billion over four years (2011–2015) was initially announced, and then further increased in 2013 by GBP 969 million of funding for 2015–2016, to support international poverty reduction by helping developing countries grow in a low carbon way, address deforestation and adapt to climate change. Under the fast-start finance pledge, the United Kingdom delivered GBP 1.5 billion during 2010–2012 and then in 2011, it launched its prosperity fund with funding for the period 2013–2014 of GBP 19.6 million, with a focus on emerging economies. The ERT commends the United Kingdom for the innovative ICF as its primary vehicle for tackling climate change and its impacts on growth and poverty reduction, for its use of other institutional channels related to the Convention, and for its pledge of GBP 1.5 billion to fast-start finance over 2010–2012 under the Copenhagen Accord.

128. Through ICF, the United Kingdom aims to: demonstrate low carbon, climate-resilient growth, including through reducing emissions from deforestation and forest degradation in developing countries; support international climate negotiations; and build an enabling environment for private sector investment by creating new partnerships and mainstreaming climate change into its official development assistance (ODA), EU development assistance and multilateral development bank lending. The United Kingdom has provided financial support for climate change related programmes and projects to a large number of countries worldwide, including countries in Africa and Asia. Mitigation (in particular, through energy efficiency and renewable energy programmes and technology) remained the biggest area for support in 2011–2012, in line with the 2 °C goal. Adaptation accounted for approximately half the funds devoted to mitigation. During the review, the United Kingdom expressed its goal of filling the gap in adaptation funding by achieving a balance between funding for mitigation and adaptation through mainstreaming. Through ICF, the United Kingdom helps to build adaptation knowledge, capacity, institutions and

evidence, as well as support direct adaptation actions. The ERT commends the United Kingdom for its new direction that will realize more funding for adaptation.

129. The United Kingdom's ODA budget is 0.7 per cent of its gross national income. In absolute terms, the total ODA amount increased from GBP 7.2 billion in 2009 to GBP 8.8 billion in 2012. The increase in total ODA was accompanied by an increase in climate finance from GBP 300 million in 2009 to GBP 712 million in 2012. Table 7 summarizes information on financial resources and technology transfer provided to developing countries by the United Kingdom, noting that the figures presented are not all identified as being climate specific.

130. In the United Kingdom, the Department of International Development compiles annual statistics and reports on financial flows to developing countries. Detailed information is also submitted to the Organisation for Economic Co-operation and Development, using Rio markers to track the allocation of funds to biodiversity, climate change and desertification. For ICF, the United Kingdom has established a comprehensive reporting framework, consisting of 15 key performance indicators, to track the effects and value for money of the ICF portfolio. The ERT was also informed about the greater scrutiny of climate finance by Parliament, the Independent Commission for Aid Impact and the National Audit Office. The ERT commends the United Kingdom for the robust monitoring and evaluation plan that will allow it to monitor progress and achievement of targets.

131. The United Kingdom provided in its NC6 information on its efforts to mobilize private investment in climate projects and infrastructure. Using ICF, these efforts focus on reducing barriers, correcting existing market failures, creating the right investment conditions and testing new and innovative approaches that can be replicated and scaled up. The United Kingdom hopes to create better understanding of private finance within ICF priority country governments, the United Kingdom Government as a whole and internationally to inform future climate finance policy and climate projects including the Green Climate Fund. The climate public private partnership (CP3) is an example of a programme where the United Kingdom is working with the Asian Development Bank and the International Finance Corporation Asset Management Company in a joint effort to encourage new forms of private sector financing of climate investments and boost economic growth in developing economies.

132. The United Kingdom also reported in its NC6 that it considers that the development of a global carbon market is critical for ensuring a cost-effective transition to global low carbon development. In this regard, the United Kingdom has promoted the use of market-based instruments both domestically and internationally. Some of the notable policies and approaches include the climate change agreements (see para. 72 above), the CRC energy efficiency scheme (see para. 65 above) and the United Kingdom Emissions Trading Scheme, which helped to shape the EU ETS. Finally, the United Kingdom is investing GBP 49 million in the World Bank's carbon initiative for development to improve access to carbon finance in least developed countries and to help some of the poorest countries to participate in the international carbon market through the clean development mechanism.

Table 7

Summary of information on financial resources and technology transfer for 2010–2012

(Millions of United States dollars)

Allocation channel of public financial support	*Years of disbursement*		
	2010	*2011*	*2012*
Official development assistance[a]	13 060	13 825	13 847

Allocation channel of public financial support	*Years of disbursement*		
	2010	*2011*	*2012*
Contributions through multilateral channels, including	NA	3 240	3 178
Contributions to the Global Environment Facility	103	114	85
Contributions through specialized United Nations bodies	NA	671	686
Contributions to the Green Climate Fund	NA	0.02	0
Contributions through the World Bank Group	NA	1 605	1 656
Contributions through bilateral and regional channels	NA	184	421
Fast-start finance			2 400[b]

Notes: (1) Official development assistance figures are for calendar years. All other figures apply to fiscal years, for example, 2011 refers to fiscal year 2011–2012. (2) Official development assistance figures were converted to United States dollars using period-average exchange rates provided by the Organisation for Economic Co-operation and Development.

Abbreviation: NA = not available.

[a] Figures in pounds sterling (prior to conversion to United States dollars) from <https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/254277/Statistics_on_International_Development_2013a.pdf>, table 1.

[b] The value is approximate and is for the period 2010–2012.

2. Technology transfer, including information under Article 10 of the Kyoto Protocol

133. The United Kingdom provided in its NC6 information on activities related to the transfer of technology and notable activities by the public and private sectors. A detailed review of the reported information is provided in chapter II.D.3 of the report of the technical review of the first biennial report.

134. The NC6 does not include information required by the UNFCCC reporting guidelines on NCs on success and failure stories of technology transfer. During the review, the United Kingdom informed the ERT that it has learned many lessons from previous projects and that these were used to avoid failure of projects. The ERT recommends that the United Kingdom report in its next NC on success and failure stories of activities related to technology transfer by completing table 6 of the guidelines, highlighting lessons learned that contributed to the success of future projects and avoidance of failure.

135. Furthermore, although the United Kingdom provided examples of what can be considered activities for financing access by developing countries to 'hard' and 'soft' environmentally sound technologies, it did not categorize and identify them as such. As a result, it is not clear which of the technologies reported is considered as 'hard' and 'soft' environmentally sound technologies. To enhance the transparency of reporting, the ERT recommends that the United Kingdom clearly identify, in its next NC, examples that specifically fulfil the reporting requirement on activities for financing access by developing countries to 'hard' or 'soft' environmentally sound technologies.

136. The United Kingdom reported in its NC6 that ICF has technology development and transfer programmes. For example, the NC6 included information elaborating on CCS technologies for which the United Kingdom provided GBP 60 million to support developing countries in developing both the technical and institutional knowledge necessary to enable deployment of CCS technologies. Other examples provided were: the renewable energy and adapting to climate technologies programme in Africa, for which the United Kingdom has contributed GBP 11 million to stimulate private sector investment for the development and delivery of low-cost clean energy and climate adaptation technologies (solar power, biogas, irrigation and water efficiency measures); the Climate Innovation

Centre in Kenya, launched with a total of GBP 9.5 million by the United Kingdom; the Danish International Development Agency and the World Bank to provide a domestic hub for climate technology innovators; and the global climate and development knowledge network (CDKN), which is a five year initiative that has received a GBP 57 million contribution to provide ongoing support to 40 developing countries to build their knowledge, capacity and action plans on climate change.

137. On the provision of capacity-building support, the United Kingdom reported in its NC6 that the majority of the projects through the bilateral and multilateral channels entail knowledge-sharing, know-how and capacity-building in the relevant areas. The United Kingdom supports climate finance institutions that provide support to developing countries such as: the GEF, which has a global support programme for developing countries undertaking national adaptation planning; the Adaptation Fund Board with its capacity-building programme to support national and regional entities in accessing its funds directly; and CDKN, which helps developing countries to develop climate plans and to access finance.

E. Vulnerability assessment, climate change impacts and adaptation measures

138. In its NC6, the United Kingdom has provided the required information on the expected impacts of climate change in the country and on adaptation options.

139. During the review, the United Kingdom provided additional information elaborating on its monitoring, reporting and verification (MRV) system for vulnerability assessment, climate change impacts and adaptation measures. The MRV process is based on a five year cycle started by the adaptation reporting power of the Government (Secretary of State) that requires public and private organizations to report on major risks and their response to those risks. Information reported is compiled in a climate change risk assessment (CCRA) that is followed by the national adaptation programme (NAP), which addresses the risks and opportunities laid out in the CCRA and establishes a number of actions required to address risks. National and local institutions, as well as reporting organizations, are responsible for the implementation of actions.

140. The Environment Agency provides technical support to help private and public organizations to adapt. The assessment of information reported by public and private organizations is performed by Defra and other relevant government departments, including in cases of occurrences of climate change impacts (e.g. Gatwick Airport, 2012). The assessment of the effectiveness and progress of the entire process is performed by the Adaptation subcommittee of CCC. Such a bottom-up iterative process provides an effective monitoring and reporting system, which is expected to grow across time in accuracy and in capacity, as well as in the effectiveness of implemented actions for adaptation. The MRV process is itself an adaptation measure for all areas of vulnerability to the impact of climate change. As with mitigation measures, the detection of needs, as well as the design of adaptation measures, is based on evidence; consequently, a large number of research projects have been, or are being, implemented to fill gaps in knowledge. The ERT commends the United Kingdom for the extensive and effective system of governance for actions on climate change adaptation that, in the opinion of the ERT, is among the most advanced governance designs implemented.

141. Table 8 summarizes the reported information on vulnerability and adaptation to climate change.

Table 8

Summary of information on vulnerability and adaptation to climate change

Vulnerable area	*Examples comments adaptation measures reported*
Agriculture and food security	*Vulnerability*: increased soil erosion due to heavy rainfall, flood risk to high quality agricultural land *Adaptation*: Government to work with the Association of Drainage Authorities and others, to identify existing good practice and explore role of Internal Drainage Board; assessment of the soil protection review to provide baseline protection for agricultural soils to ensure soils are as resilient as possible; Biotechnology and Biological Sciences Research Council and Natural Environment Research Council actions on soils research programme; the Government's statement of intention in the natural environment white paper establishes that all soils will be managed sustainably, and degradation threats tackled successfully by 2030
Biodiversity and natural ecosystems	*Vulnerability*: changes in species migration patterns; species unable to track changing 'climate space'; northward spread of invasive non-native species; wildfires due to warmer and drier conditions; replacement of native species with invasive non-native species *Adaptation*: the Department for Environment, Food and Rural Affairs (Defra) is working with its agencies and with wildlife and wild bird specialists (i.e. the Wildfowl and Wetlands Trust and the British Trust for Ornithology) to look at emerging threats to biodiversity as a result of climate change; Defra is reviewing the invasive non-native species framework strategy for Great Britain (2008) to ensure that prevention, detection, rapid response, long-term mitigation and control continue to take account of new and emerging risks; local resilience forums will review and consider the severe wildfire risk, as will the Fire and Rescue Service through their integrated risk management plan process; the Forestry Commission is publishing guidance for land managers to increase the resilience of woodland to wildfire through forest design planning (including forest structure and species); develop a strategy for notification and review of designated areas to consider implications of climate change; develop tools to improve delivery including a climate change adaptation manual and vulnerability tools for conservation and land managers
Coastal zones	*Vulnerability*: decline in marine water quality due to sewer overflows; risks to species and habitats due to coastal evolution *Adaptation*: • Coastal change pathfinder programme on how policy on supporting community adaptation to coastal change could be developed in future; shoreline management plans (SMPs) to assess the physical risks associated with coastal processes, to reduce these risks to people and the developed, historic and natural environments in a sustainable manner; • Long-term investment strategy presents evidence base for long-term flood and coastal risks and for the costs of managing those risks; the strategy is being updated and will contain advice for the Government on the long-term outlook for flooding and erosion; The Environmental Agency (EA) to work with partners including local councils to ensure that SMPs value the ecosystem benefits to the wider environment; SMPs will address flood control and potential habitat losses from climate change, including how to compensate for losses at nature reserves and designated sites
Drought	*Vulnerability*: increased water demand for irrigation of crop; risks to species and habitats due to drier soils *Adaptation*: see agriculture and food security
Fisheries	*Vulnerability*: changes in fish catch latitude/centre of gravity (cod and haddock); decline in productivity of 'cold water' fish and shellfish stocks *Adaptation*: given the uncertainty around the effects on the marine environment, the Government is working directly with other marine organizations through the marine climate change impacts partnership (MCCIP); MCCIP aims to develop and share knowledge, guidance, best practice tools and strategies for the sector and to identify current shortcomings in national marine climate science

Vulnerable area	*Examples comments adaptation measures reported*
Forests	*Vulnerability*: forest pest (red band needle blight); decline in potential yield of beech forests *Adaptation*: implementation of the tree health and plant biosecurity action plan is being accelerated. Forestry Commission's adaptation plan sets out particular steps that, alongside industry action, are essential for building a sustainable forestry sector; these actions include the further development of advice and guidance on species diversification and the implementation of the climate change action plan for public forests
Human health	*Vulnerability*: summer mortality due to higher temperatures; mortality due to summer air pollution; effect of floods/storms on mental health; number of people at significant risk of flooding *Adaptation*: heat-wave plan and cold weather plan for England are both reviewed annually; these will be further reviewed to ensure they reach beyond the immediate health sector and help safeguard the most vulnerable people; this approach reflects the findings of the economics of climate resilience report, which found that alert systems, preparedness, communication, coordination across the health and social care service, and targeted support to the most vulnerable communities are likely to be the most effective actions to address heat risks to public health; the documents National Health Service (NHS) emergency planning guidance (2005) and NHS emergency planning guidance on planning the psychosocial and mental health care of people affected by major accidents and disasters (2009) set out the role of the NHS in addressing health risks from flooding including risks to mental well-being; EA and Met Office continue to work together to develop and improve national flood detection and forecasting services provided by the Flood Forecasting Centre, including for surface water
Infrastructure and economy	*Vulnerability*: insurance industry exposure to flood risk; business disruption due to flooding; flooding damages to residential property; scouring of road and rail bridges; loss of staff hours due to high internal building temperatures; overheating of buildings; energy demand for cooling; losses along energy transmissions due to heat; occurrences estimated with medium confidence and expected to have low consequences in the short and medium periods (2010–2069); and medium consequences thereafter *Adaptation*: • Flood and coastal erosion risk management over four years to March 2015 – this will enable 165,000 households to benefit from new and improved defences; • Drain London is a multi-year programme to manage surface water flood risk in London; • The national planning policy framework 2012 states that local planning authorities with their communities should proactively plan to adapt to climate change and take full account of flood risk, coastal change and water supply; • The Flood and Water Management Act 2010 provides for increased uptake of sustainable drainage systems (SuDSs) in new developments; schedule 3 will establish a SuDS approving body (SAB) in county or unitary authorities, subject to stipulated exemptions and also subject to affordability. SABs will approve drainage systems before construction begins according to new national SuDS standards; • The 2012 national infrastructure plan's detailed pipeline of infrastructure investment will ensure that infrastructure is resilient to climate change impacts; • The Network Rail strategic business plan for 2014–2019 includes the need to future proof critical infrastructure against the impacts of changing weather; • The Chartered Institute of Building Service Engineers has produced guidance on new overheating criteria in European buildings and assessment methodology; The National House Building Council Foundation has undertaken a review of the evidence of overheating in new homes and issued guidance for house builders and designers on how to avoid the problem; to support the mitigation of overheating risks, Defra has commissioned the zero carbon hub to increase industry awareness of future overheating in new homes; • The London heat thresholds project attempts to establish a generic, flexible pathway that identifies thresholds for London and its urban systems; in the first phase, the London climate change partnership has produced recommendations to improve policy and practice relating to hot weather planning and heat risk management;

Vulnerable area	*Examples commonly adaptation measures reported*
	• The Government has funded research into future energy demand for cooling that predicted energy demand for domestic cooling could triple between 2010 and 2050 and called for more research to develop a better understanding of effective approaches to tackling overheating at the building and neighbourhood scale
Water resources	*Vulnerability*: public water supply–demand deficits, lower summer rivers flow *Adaptation*: • The national planning policy framework 2012 indicates that local planning authorities and their communities should proactively plan to adapt to climate change, full account should be taken of flood risk, coastal change and water supply • Water companies have a statutory duty to promote efficient use of water by customers, which has resulted in a range of activities such as tips for saving water, retrofit programmes, school education programmes and the offer of subsidized water butts; by 2015, EA will deliver the second cycle of river basin management plans and the assessment of climate change risks and necessary adaptation actions will be integrated within them; EA works to reduce the environmental impact of the over abstraction of water through its restoring sustainable abstraction programme, and has reviewed thousands of licences and changed many of the most damaging ones

Sources: (1) Vulnerability: United Kingdom climate change risk assessment (2012); (2) Adaptation: national adaptation programme (2013).

142. The NC6 explains that action on adaptation in the United Kingdom is mandated by section 3.3.6 of the Climate Change Act. The act lays out a framework for adaptation that instituted the two instruments to carry out adaptation: the CCRA, which every five years assesses the main risks and opportunities arising from climate change in the United Kingdom, and the NAP built on the basis of the CCRA. The CCRA is then revised according to the implementation of activities established by the NAP and any newly available evidence. Both the CCRA and the NAP are new elements, compared with the NC5, in the United Kingdom's approach to adapt to climate change.

143. The CCRA has been conducted using a novel methodology that allows the assessment of over 700 potential impacts of climate change with detailed analysis for over 100 of them across 11 key sectors, considering their likelihood, the scale of their potential impacts and the urgency with which action may be needed to address them, comparing over 100 risks from a number of disparate sectors. A key strength of the analysis is using a consistent method and set of climate projections to look at current and future risks and opportunities. In addition, the method focuses its attention on risks where decisions need to be made in the near future (i.e. in the next five years).

144. To provide a baseline that can be more easily used to assess the effectiveness of actions or policy interventions, with the exception of a few specific cases, the CCRA does not build in societal change in assessing future risks, either from non-climate-related change (e.g. in demographics, technology and economic growth) or from responses to climate risks (e.g. government policy or private adaptation investment). According to the latest updated project of climate change (UKCP09) provided by the Met Office, the United Kingdom expects, with different levels of confidence, to experience the following in future years: periods of continuously high temperatures longer than before and higher peak temperatures – the summer heat-wave experienced in 2003 is likely to become a normal event by the 2040s and be considered cool by the 2080s; decreased seasonal rainfall in summer, perhaps leading to drought, lower river flow and increased water stress; more frequent periods of heavy rainfall, especially in winter, which may lead to increased flooding; continuing global sea level rise – by 2100, sea levels could have risen by approximately 80 cm around some parts of the United Kingdom's coast, and even larger

increases cannot be ruled out. Notably, the United Kingdom is also evaluating the impact that changes in climate occurring in the world outside its boundaries will affect its economy and the lifestyle of its citizens.

145. The United Kingdom aims at allocating 50 per cent of finance from its ICF to activities on adaptation for providing support, by 2015, to over 20 million climate-vulnerable people. Among financed activities are: the pilot programme for climate resilience designed to deliver transformational outcomes in a small number of pilot countries through supporting the integration of climate resilience into development planning and budgeting; the Least Developed Countries Fund to support concrete adaptation activities that aim at reducing vulnerability and increasing the adaptive capacity of over 860,000 of the most climate-vulnerable people; the building resilience and adapting to climate extremes and disasters programme that aims at building capacity to cope with extreme weather events of up to 5 million climate-vulnerable people; the adaptation for smallholder agriculture programme that aims at helping up to 6 million smallholder farmers cope with the impacts of climate change; the South Asia water governance programme that aims at helping countries work together to manage the Himalayan rivers on which 500 million climate-vulnerable people depend; and the chars livelihoods programme in Bangladesh that aims at helping those living in extreme poverty, especially women, build livelihoods that are more resilient to climate change.

146. The IDR/NC5 contains an encouragement by the ERT to the United Kingdom to include information on impacts of climate change on human health. The ERT noted that the NC6 contains information on the impacts of climate change on human health; the ERT commends the United Kingdom for this improvement.

F. Research and systematic observation

147. The United Kingdom has provided information on its actions relating to research and systematic observation, and addressed both domestic and international activities, including the World Climate Programme, the International Geosphere–Biosphere Programme, the Global Climate Observing System (GCOS) and the IPCC. The NC6 also reflects action taken to support related capacity-building in developing countries. Furthermore, the United Kingdom has provided a summary of information on GCOS activities.

148. During the review, the United Kingdom provided additional information elaborating on international data and information exchange, as well as on access to data and research. The United Kingdom co-hosts the IPCC Data Distribution Centre, as well as the European Centre for Medium-Range Weather Forecasts and the European Space Agency's Climate Office in Harwell, which, among other projects, hosts Jason-3 on monitoring ocean height. Regarding data access, the government and research councils have a policy of open access to data, which are made available through public databases. Examples of publicly available databases include: the living with environmental change's Envirobase; the United Kingdom Energy Research Centre; the United Kingdom environmental observation framework catalogue and the historic records of the Met Office (Met Office Hadley Centre model data are distributed through the climate impacts LINK project that provides simulations to the United Kingdom and the international academic community); the Global Collecting Centre for marine climatological data, the British Oceanographic Data Centre for biological, chemical, physical and geophysical oceanographic data; the British Atmospheric Data Centre; the Polar Data Centre; the Environmental Information Data Centre that includes the national river flow archive; and the Centre for Environmental Data Archival that includes the JASMIN cloud computing facility. The ERT commends the United Kingdom for its

open-access policy and for its leadership at international level on research on climate-related issues.

149. Evidence is the basis of the policymaking process in the United Kingdom; consequently, a wide range of research is funded by the United Kingdom, at country and at international level, on: climate systems; impacts of climate change; risks of dangerous climate change; options and pathways to mitigation, including specific policy measures; and options for adapting to unavoidable climate change. Research and systematic observation activities are funded by a number of government departments and agencies. DECC, which has the lead on climate change policy, provides funds for climate research and observations to advise the United Kingdom's policy and its impacts and response strategies. Defra is responsible for domestic adaptation to climate change and provides funds for environmental observations, including some climate observations. The Department for Business, Innovation and Skills funds work on new technologies and provides funding for research councils. The research council with the greatest direct interest in climate observations is the Natural Environment Research Council (NERC), which is responsible for basic research on climate prediction and processes and for some monitoring activities. The Met Office, as the national meteorological agency, also has a strong involvement in climate research (undertaken at its Hadley Centre) and observation.

150. Other sources of finance of climate-related research are: the Department of Transport; the Department for Communities and Local Government; the Foreign and Commonwealth Office; the Department of Health; the Energy Technologies Institute; Public Health England; and the Devolved Administrations. Given the large number of initiatives and sources of fund, coordination of research activities is particularly relevant for the United Kingdom, and is achieved by programmes, collaborations, committees, partnerships, 'virtual' centres such as the United Kingdom Energy Research Centre, the research councils energy programme, the Marine Science Coordination Committee, the United Kingdom collaborative on development sciences, the living with environmental change partnership, UKEOF and the United Kingdom marine monitoring and assessment strategy. Funding for research is secured in the financial budget; in chapter 7.10 of the NC6, it is reported that "In a time of constrained budgets it can sometimes be difficult to secure sustained funding for long-term observation activities, to mitigate against this risk, the Government Chief Scientific Advisor's Environmental Observations Committee was set up in 2013". The menu of research activities implemented by the United Kingdom includes all sectors including research activities targeted specifically to inform the policymaking process (e.g. international dimensions of climate change, and migration and global environmental change) and to make low carbon development an economic viable option.

151. A number of research activities at domestic and international level are implemented by the United Kingdom in the areas of: climate processes and systems (e.g. the Arctic research programme, the NERC ice sheet stability programme, the changing water cycle programme and all research programmes that inform the GHG inventory); modelling and prediction (e.g. AVOID 2 and the United Kingdom earth system model (HadGEM3)); impacts (e.g. the ocean acidification research programme, the United Kingdom droughts and water scarcity research programme, and biodiversity monitoring and research in the United Kingdom); mitigation choices (e.g. the Centre for Climate Change Economics and Policy, the Energy Saving Trust and the Sustainable Lifestyles Research Group); and mitigation technologies (e.g. the innovation programme on offshore wind, CCS, bioenergy, nuclear fission and buildings; technology innovation needs assessment, in particular, to identify and value the main innovation needs of specific low carbon technologies; the Energy Technologies Institute on bridging the gap between laboratory and commercial deployment of low carbon technologies; the sustainable pathways for low carbon energy research programme; the low impact buildings innovation platform; the low carbon fuels

innovation platform; the low carbon fuels programme; and the integrated assessment of geoengineering proposals).

152. The United Kingdom is actively assisting developing countries by supporting their participation in a number of projects aimed at: improving the operation of the GCOS surface network and the GCOS upper-air network, primarily in equatorial areas of Africa, South America and on oceanic islands; establishing a World Meteorological Organization (WMO) global atmosphere watch station on Sao Vicente, Cape Verde, that also contributes to build capacity associated with the atmospheric composition research in the West African region; coordinating the international research network on surface temperature (EarthTemp); developing traceable land air temperature data sets by the international surface temperature initiative; and establishing a common set of climate monitoring products that all nations around the world could produce in order to facilitate their participation in global climate monitoring activities (WMO OPACE task team on national climate monitoring products).

153. Furthermore, the United Kingdom has programmes of support on: improved knowledge and evidence on adaptation to climate change on the 10–40 year timescale (climate science research partnership); collaborative research to inform adaptation policy and practice to build the resilience of vulnerable populations and their livelihood (collaborative adaptation research initiative in Africa and Asia); support to decision makers to design and deliver climate compatible development (CDKN); an initiative aimed at providing policymakers with new information and approaches in bioenergy (policy innovation systems for clean energy security); agricultural emissions modelling and the linkages between GHG emissions and improved animal health and welfare (global research alliance on agricultural GHGs); and the importance of environmental systems to poverty alleviation and their potential effects on future changes, including climate change (ecosystem services for poverty alleviation and unlocking the potential for groundwater in Africa). Finally, the GBP 3.87 billion ICF (see para. 127 above) finances a number of projects on climate science, especially in Africa.

154. In annex 3 of its NC6, the United Kingdom reports on national activities implemented according to the implementation plan of the GCOS, to which it contributes also as a partner in EU projects and programmes on systematic observation, as well as through its UKEOF. Systematic observations in the United Kingdom and its overseas territories and Antarctica are made by a number of national agencies and organizations. The Met Office is the lead agency for making and collecting meteorological and atmospheric observations. Observations are also made by others, including NERC research centres and other national capability delivery partners. These include the British Antarctic Survey, the British Geological Survey, the Centre for Ecology and Hydrology, the National Centre for Atmospheric Science, the National Centre for Earth Observation and the National Oceanography Centre. In addition to national weather stations, the United Kingdom manages 11 of the 172 stations of the GCOS upper-air network and 150 of the 3,629 floats of the Argo marine network.

155. Although the United Kingdom has reported information in its NC6 on expected constraints on and barriers to cooperation on systematic observation as well as to free and open international exchange of data and information, and has integrated its report with additional information during the review week, the ERT encourages the United Kingdom to report information on how constraints and barriers on cooperation on systematic observation, as well as to free and open international exchange of data and information, are addressed by its programmes of cooperation on research and systematic observations, including those financed through ICF.

G. Education, training and public awareness

156. In its NC6, the United Kingdom provided information on its actions relating to education, training and public awareness at both the domestic and international level. Compared to the NC5, the Party provided more extensive information on education, training and public awareness.

157. During the review, the United Kingdom provided additional information elaborating on the Met Office climate service that will provide businesses and society with information to help make them more resilient to climate variability and change. The United Kingdom also provided information on its 2050 calculator, which allows exploring the full range of options for reducing GHG emissions to the year 2050 based on rigorous scientific evidence, in order to engage people in conversations about mitigating climate change by increasing understanding of benefits, costs and trade-offs involved. Furthermore, subject to funding availability, the Met Office is planning to develop and produce additional specific content for social media, which appear to be the most effective channel of communication for inducing cultural (behavioural/technological) changes. In addition, the Devolved Administrations are active in raising public awareness on climate change (e.g. the greener together campaign in Scotland to promote changes in behaviours to reduce emissions, or the way to go campaign in Wales to challenge members to make simple but achievable changes to their lifestyles and become more ecologically knowledgeable).

158. To inform a societal change, the United Kingdom has revised the curricula of British students by adding climate-related issues. Furthermore, a green fund, which is self-managed by students, has been established to support projects on sustainability. The Devolved Administrations of Scotland, Wales and Northern Ireland, which have broad responsibility for education, are active and are engaged in a number of projects including: the live greener Wales and green impact projects aimed at decreasing energy consumption and GHG emissions in Wales, and the Scottish curriculum for excellence and learning for sustainability aimed at providing curricula on sustainability, including climate change, and the community learning junior climate challenge fund to provide support for communities throughout Scotland to reduce their carbon impact and move to low carbon living.

159. At international level, the 2050 calculator in its national specific versions, as well as in its global version, is aimed at building knowledge on climate change and actions needed to mitigate it. Many projects funded by ICF have a component on education training and public awareness, such as the Climate Innovation Centre in Kenya (see para. 136 above).

160. In the IDR/NC5, the United Kingdom was encouraged to report information on the extent of the participation of public organizations and non-governmental organizations (NGOs) in the preparation and/or domestic review of NCs. The ERT noted that information on the participation of other public organizations, for example Defra, is reported in the NC6. The ERT also noted that information on the involvement of the CCC on climate change mitigation and adaptation has been presented and therefore the encouragement can be considered as implemented. However, DECC and other NGOs may benefit from an exchange of views in compiling the NC: DECC from receiving comments and NGOs from the opportunity to have an in-depth presentation/scrutiny of all ongoing actions and activities related to climate change. The ERT therefore reiterates the encouragement to the United Kingdom to report information on the involvement of NGOs in the preparation and/or review of its next NC.

III. Summary of reviewed supplementary information under the Kyoto Protocol

A. Overview of supplementary information under Article 7, paragraph 2, of the Kyoto Protocol

161. Supplementary information provided by the United Kingdom under Article 7, paragraph 2, of the Kyoto Protocol in its NC6 is mostly complete and transparent. The supplementary information is located in different sections of the NC6. Table 9 provides an overview of supplementary information under Article 7, paragraph 2, of the Kyoto Protocol as well as references to the NC6 chapters in which this information is provided.

162. The United Kingdom has not reported the following elements of the supplementary information required under Article 7, paragraph 2, of the Kyoto Protocol: information on institutional arrangements and decision-making procedures to coordinate activities related to participation in the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol, including the participation of legal entities; and identification of steps taken to promote and/or implement any decisions by the IMO to limit or reduce GHG emissions not included in the Montreal Protocol from marine bunker fuels. The technical assessment of the information reported under Article 7, paragraph 2, of the Kyoto Protocol is contained in the relevant sections of this report. The ERT reiterates the recommendation that the United Kingdom include these reporting elements in its next NC.

Table 9
Overview of supplementary information under Article 7, paragraph 2, of the Kyoto Protocol

Supplementary information	*Reference to the sixth national communication*
National registry	Chapter 2, section 2.3 and national inventory report
National system	Chapter 2, section 2.3 and standard independent assessment report
Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17	Chapter 3
Policies and measures in accordance with Article 2	Chapters 4 and 6
Domestic and regional programmes and/or legislative arrangements and enforcement and administrative procedures	Chapters 1 and 3
Information under Article 10	Chapter 6
Financial resources	Chapter 5

B. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol

163. The United Kingdom reported the information requested in section II, "Minimization of adverse impacts in accordance with Article 3, paragraph 14", of the annex to decision 15/CMP.1 as a part of its 2014 annual submission under Article 7, paragraph 1, of the Kyoto Protocol. During the review, the United Kingdom provided the ERT with additional information on how it strives to implement its commitments under Article 3, paragraph 1, of the Kyoto Protocol in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention. The ERT considers the

reported information to be complete and transparent. The ERT commends the United Kingdom for the additional information provided.

164. The 2014 and previous national inventory reports and the additional information provided during the review presented several initiatives of the United Kingdom aimed at minimizing adverse impacts, including: in quantifying the impacts of response measures (e.g. by developing the global version of the 2050 calculator of GHG emissions), cooperating in the development of technologies (e.g. the International Renewable Energy Agency; the CP3 that supports projects delivering renewable and efficient energy, new technology and protects natural resources in emerging and developing countries; the green Africa power project, to tackle specific constraints to private sector investment in renewable power generation in Africa; the scaling up renewable energy programme; the Asian Development Bank and the World Bank trust funds to support technical and institutional knowledge necessary to enable the deployment of CCS technologies in developing countries; and climate innovation centres in developing countries), assisting developing Parties that are highly dependent on the export of fossil fuels in diversifying their economies (e.g. the World Bank's partnership for market readiness to help developing countries design market-based mechanisms for reducing their GHG emissions, so fostering increased investment in green technologies, and the nationally appropriate mitigation action (NAMA) facility to fund the most transformational parts of NAMA plans that shift a technology or sector in a country onto a low carbon development trajectory); conducting relevant research (e.g. research on sustainability of feedstock for bioenergy; investigating the United Kingdom carbon footprint; projects on low carbon technology transfer to China and India; understanding sustainable energy solutions in developing countries; and the international partnership for energy efficiency cooperation with key developed and developing countries to share experience and learn from each other's policy successes and failures).

IV. Conclusions and recommendations

165. The ERT conducted a technical review of the information reported in the NC6 of the United Kingdom according to the UNFCCC reporting guidelines on NCs. The ERT concludes that the NC6 provides a good overview of the national climate policy of the United Kingdom. The information provided in the NC6 includes most elements of the supplementary information under Article 7 of the Kyoto Protocol, with the exception of: information on institutional arrangements and decision-making procedures to coordinate activities related to participation in the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol (although the United Kingdom is achieving its target under the Kyoto Protocol with domestic measures only); and identification of steps taken to promote and/or implement any decisions by the IMO to limit or reduce GHG emissions not included in the Montreal Protocol from marine bunker fuels.

166. The United Kingdom's emissions in 2012 were estimated to be 25.2 per cent below the 1990 level excluding LULUCF and 26.2 per cent below including LULUCF. Emission decreases were driven by factors including the shift from coal-fired power generation towards electricity generation based on natural gas and renewable energy, the tighter regulation of landfills, energy efficiency standards and the abatement of emissions in adipic acid and nitric acid production. These factors outweighed growth in population and economic output.

167. Based on the comparison of the target and the average annual emissions for 2008–2012, the United Kingdom is expected to meet its Kyoto Protocol target for the first commitment period (a 12.5 per cent reduction below the base year). The United Kingdom is

not planning to make use of the Kyoto Protocol mechanisms to meet its Kyoto Protocol target other than in the context of the EU ETS.

168. The GHG emission projections provided by the United Kingdom in the NC6 include a 'with measures' scenario for 2015, 2020, 2025 and 2030, presented relative to actual inventory data. The projected GHG emission reductions under this scenario, compared to the 1990 base year emission level, are a 43.4 per cent decrease in 2020 and a 48.7 per cent decrease in 2030.

169. The United Kingdom participates in and contributes to the EU target of a 20 per cent emission reduction in 2020 under the Convention and the Kyoto Protocol second commitment period, compared to the 1990 base year. At the time of the review, national targets for EU member States for the second commitment period of the Kyoto Protocol and the Convention had not yet been decided. Sectors covered under the EU ETS have an EU-wide emissions cap and can purchase emission credits to offset GHG emissions. For the non-ETS sectors (excluding LULUCF under the Kyoto Protocol), the United Kingdom has a 16 per cent emission reduction target by 2020 compared with the 2005 level. Considering the existing and planned PaMs, the United Kingdom reported that it expects to meet the 2020 target and does not plan to use units from market-based mechanisms or accounting for LULUCF activities for compliance.

170. The key climate and energy policy framework in the United Kingdom is the Climate Change Act of 2008, which provides a long-term framework to reduce GHG emissions in five year carbon budget cycles. It provides the legally binding framework for institutions and PaMs that aim at reducing GHG emissions. The carbon plan (2011) sets out proposals for achieving the emission reductions committed to in the first four carbon budgets (2008–2027). The key PaMs reported in the NC6 expected to contribute the most annual avoided emissions in 2020 include the new energy supply policies (comprising EMR (2013), the renewable energy strategy and CCS) (73,113 kt CO_2 eq); the buildings regulations part L (2002, 2005 and 2006) (10,421 kt CO_2 eq); national products policy (standards for energy-using products) tranches 1 and 2 (2009 and 2013) (8,951 kt CO_2 eq); car policies (EU new car CO_2 emission targets (2012)) (7,510 kt CO_2 eq); buildings regulations part L (2010) (5,849 kt CO_2 eq); and the RHI (2011) (5,631 kt CO_2 eq).

171. The Climate Change Act (2008) provides for a strong accountability system under which ex ante impact assessments for policy design and ex post monitoring and evaluation of the implementation and effectiveness of PaMs are carried out in a systematic manner. In addition, the independent CCC established by the act advises the Government on the planning of the carbon budgets and on the policies to meet them, using an evidence-based approach. CCC also monitors and evaluates progress in meeting the carbon budgets and in reducing emissions to achieve the 2050 target, and makes recommendations to the Government on the way forwards in its annual report on progress to Parliament. The Government (DECC) also publishes a response to the CCC progress report, outlining how it intends to implement the recommendations.

172. The United Kingdom provided GBP 66.5 million in 2010, GBP 73.5 million in 2011 and GBP 52.5 million in 2012 to the GEF (a total of GBP 192.5 million over three years) compared to GBP 140 million for 2008–2009 (current GBP values). The United Kingdom uses its ICF as the main mechanism for delivering financial support for climate change activities. A budget of GBP 2.9 billion over four years (2011–2015) was initially announced, and then further increased in 2013 by GBP 969 million of funding for 2015–2016, to support international poverty reduction by helping developing countries grow in a low carbon way, address deforestation and adapt to climate change. Under the fast-start finance pledge, the United Kingdom delivered GBP 1.5 billion during 2010–2012 and then in 2011, it launched its prosperity fund with funding for the period 2013–2014 of GBP 19.6 million, with a focus on emerging economies.

173. Action on adaptation in the United Kingdom is mandated by section 3.3.6 of the Climate Change Act. The act lays out a framework for adaptation that instituted the two instruments to carry out adaptation: the CCRA, which every five years assesses the main risks and opportunities arising from climate change in the United Kingdom, and the NAP built on the basis of the CCRA. The CCRA is then revised according to the implementation of activities established by the NAP and any newly available evidence. The CCRA has been conducted using a novel methodology that allows the assessment of over 700 potential impacts of climate change with detailed analysis for over 100 of them across 11 key sectors, considering their likelihood, the scale of their potential impacts and the urgency with which action may be needed to address them, comparing over 100 risks from a number of disparate sectors.

174. Policymaking in the United Kingdom is largely evidence based. As such, a wide range and large number of research and systematic observation activities are funded by the United Kingdom, both nationally and internationally, including on making low carbon development an economically viable option. Research and observation activities are mainly undertaken on: the climate processes and systems; the impacts of climate change; the risks of dangerous climate change and the options for adapting to unavoidable climate change; and cost-effective options and various pathways to mitigation, including specific policy measures and mitigation technologies. The United Kingdom is actively engaged in: assisting developing countries participate in research and observation projects and programmes on atmospheric composition and surface temperature; improving knowledge and evidence to adapt to climate change; and supporting decision makers to design and deliver climate compatible development, for example, on approaches in bioenergy, agricultural emissions modelling, on the linkages between GHG emissions and improved animal health and welfare, and on the importance of environmental systems to poverty alleviation.

175. Education, training and public awareness-raising on climate change are an essential component to action undertaken by the United Kingdom Government and the Devolved Administrations of Scotland, Wales and Northern Ireland, which have broad responsibility for education. To inform a societal change, the United Kingdom has revised the curricula of students by adding climate-related and broader sustainability issues. Furthermore, a green fund, which is self-managed by students, has been established to support projects on sustainability. The Government has also developed and made available to the public its 2050 calculator, which allows exploring the full range of options for reducing GHG emissions to the year 2050 and is based on rigorous scientific evidence. The Met Office is also actively engaged in communicating information on climate change and has developed a range of information, such as videos and blogs, which are made available to the general public.

176. Supplementary information under Article 7, paragraph 1, of the Kyoto Protocol on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol was provided by the United Kingdom in its 2014 annual submission.

177. In the course of the review, the ERT formulated several recommendations relating to the completeness and transparency of the United Kingdom's reporting under the Convention and its Kyoto Protocol. The recommendations[a] are that the United Kingdom:

(a) Improve the completeness of reporting by including in its next NC the following information:

[a] The recommendations are given in full in the relevant sections of this report.

(i) Institutional arrangements and decision-making procedures to coordinate activities related to participation in the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol, including the participation of legal entities (see para. 26 above);

(ii) Textual descriptions of how the PaMs affect specific gases (see para. 35 above);

(iii) How it promotes and implements IMO decisions to limit emissions from marine bunker fuels (see para. 91 above);

(iv) The total effect of PaMs presented by gas (see para. 117 above);

(v) Success and failure stories of activities related to technology transfer (see para. 134 above);

(vi) Activities for financing access by developing countries to 'hard' or 'soft' environmentally sound technologies (see para. 135 above);

(b) Improve the transparency of reporting by including in the next NC the following information:

(i) Consistent naming of PaMs throughout its NCs and BRs (see para. 34 above);

(ii) Clarification of how it has determined that financial resources are "new and additional" (see para. 124 above).

Annex

Documents and information used during the review

A. Reference documents

"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention. Part II: UNFCCC reporting guidelines on national communications". FCCC/CP/1999/7. Available at <http://unfccc.int/resource/docs/cop5/07.pdf>.

"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention. Part I: UNFCCC reporting guidelines on annual inventories". FCCC/CP/1999/7. Available at <http://unfccc.int/resource/docs/cop5/07.pdf>.

"Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol". Decision 15/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=54>.

"Guidelines for review under Article 8 of the Kyoto Protocol". Decision 22/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=51>.

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Sixth national communication of the United Kingdom of Great Britain and Northern Ireland. Available at <http://unfccc.int/files/national_reports/annex_i_natcom/submitted_natcom/application/pdf/uk_6nc_and_br1_2013_final_web-access[1].pdf>.

2013 GHG inventory submission of the United Kingdom of Great Britain and Northern Ireland. Available at <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/national_inventories_submissions/application/zip/gbr-2013-nir-15apr.zip>.

2014 GHG inventory submission of the United Kingdom of Great Britain and Northern Ireland. Available at <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/national_inventories_submissions/application/zip/gbr-2014-nir-15apr.zip>.

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Andy Smith (Department of Energy and Climate Change), including additional material on updated policies and measures, greenhouse gas projections, the national registry and recent climate policy developments in the United Kingdom of Great Britain and Northern Ireland. The following documents[1] were also provided by the United Kingdom:

Meeting Carbon Budgets – 2014 Progress Report to Parliament. Government response to the Sixth Annual Progress Report of the Committee on Climate Change. Department of Energy and Climate Change. Available at <www.gov.uk/government/publications>.

Updated energy and emissions projections 2014. Department of Energy and Climate Change. Available at <https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/368021/Updated_energy_and_emissions_projections2014.pdf>.

The National Adaptation Programme. Making the country resilient to a changing climate. 2013. Department for Environment, Food and Rural Affairs. Available at <https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/209866/pb13942-nap-20130701.pdf>.

United Kingdom Climate Change Risk Assessment: Government Report, 2012. Department for Environment, Food and Rural Affairs. Available at <https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69487/pb13698-climate-risk-assessment.pdf>.

[1] Reproduced as received from the Party.